MITSUBISHI SEMICONDUCTORS 1993

RF POWER SEMICONDUCTORS

DATA BOOK

MITSUBISHI ELECTRIC

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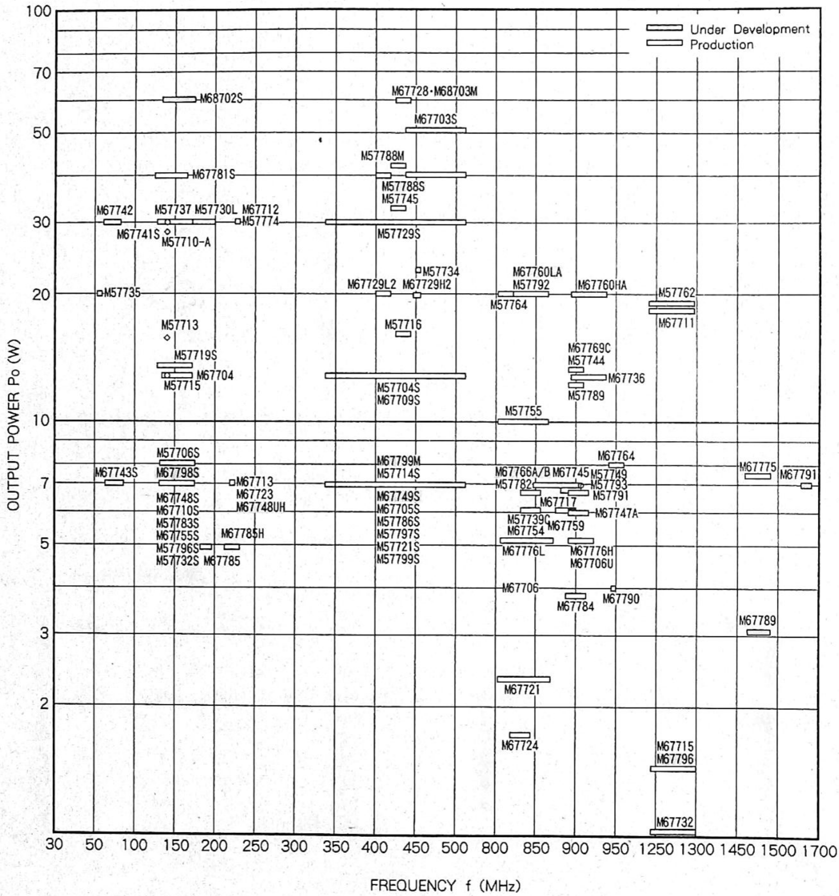
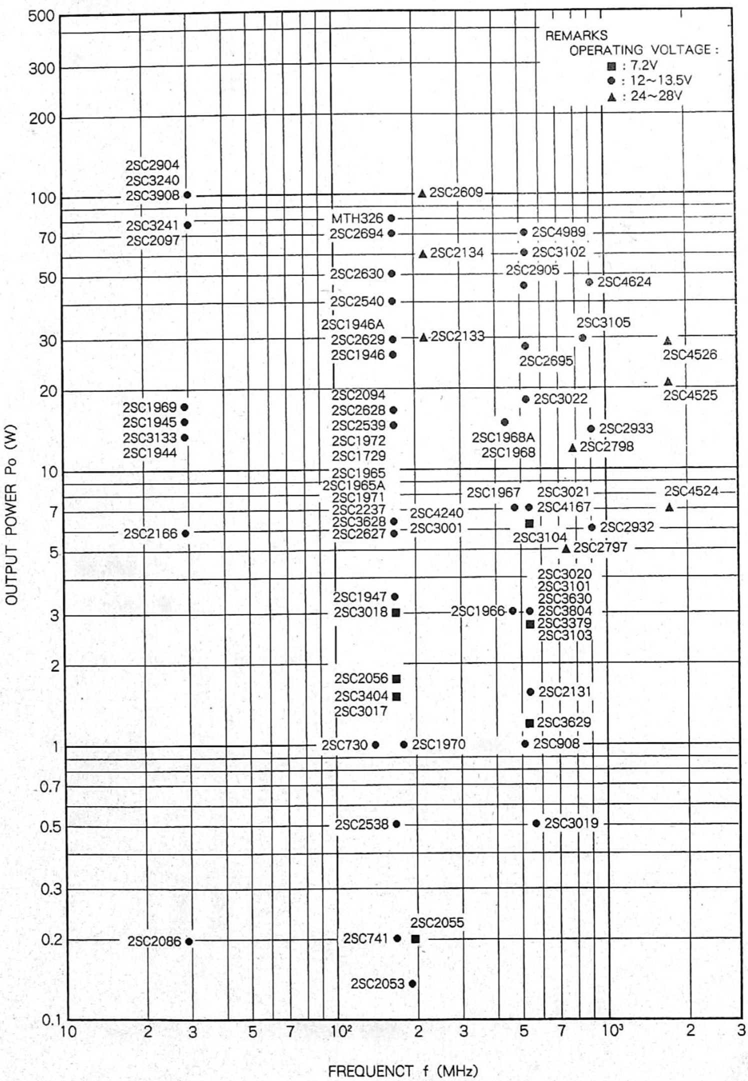
M67781H	2 – 278	2SC2540	3 – 98	2SC4526	3 – 216
M67783	2 – 279	2SC2609	3 – 101	2SC4624	3 – 220
M67784	2 – 281	2SC2627	3 – 104	2SC4838	3 – 223
M67785	2 – 283	2SC2628	3 – 107	■ ANTENNA SWITCHES	
M67785H	2 – 286	2SC2629	3 – 110	MI105	4 – 3
M67789	2 – 287	2SC2630	3 – 113	MI204	4 – 5
M67790	2 – 289	2SC2694	3 – 116	MI301	4 – 7
■ HIGH FREQUENCY		2SC2695	3 – 119	MI303	4 – 10
HIGH POWER		2SC2797	3 – 122	MI308	4 – 13
TRANSISTORS		2SC2798	3 – 124	MI402	4 – 16
2SC730	3 – 3.	2SC2799	3 – 126	MI407	4 – 19
2SC741	3 – 6	2SC2904	3 – 129	MI809	4 – 22
2SC908	3 – 9	2SC2905	3 – 132	■ HYBRID ANTENNA	
2SC1324	3 – 13	2SC2932	3 – 135	SWITCHES	
2SC1729	3 – 17	2SC2933	3 – 137	MD001	5 – 3
2SC1945	3 – 20	2SC3001	3 – 140	MD001A	5 – 6
2SC1946	3 – 23	2SC3017	3 – 143	MD001AL	5 – 9
2SC1946A	3 – 26	2SC3018	3 – 145	MD001H	5 – 12
2SC1947	3 – 29	2SC3019	3 – 148	MD001HL	5 – 16
2SC1965	3 – 32	2SC3020	3 – 152	MD001L	5 – 20
2SC1966	3 – 35	2SC3021	3 – 155	MD003	5 – 23
2SC1967	3 – 38	2SC3022	3 – 158	MD003A	5 – 26
2SC1968	3 – 41	2SC3101	3 – 161	MD003H	5 – 29
2SC1968A	3 – 44	2SC3102	3 – 163	MD004	5 – 32
2SC1969	3 – 47	2SC3103	3 – 166	MD004H	5 – 35
2SC1970	3 – 50	2SC3104	3 – 169	MD007L	5 – 38
2SC1971	3 – 53	2SC3105	3 – 172		
2SC1972	3 – 56	2SC3133	3 – 174		
2SC2053	3 – 59	2SC3240	3 – 177		
2SC2055	3 – 62	2SC3241	3 – 180		

KINDS OF FUNCTION MAP



MITSUBISHI ELECTRIC

KINDS OF FUNCTION MAP



SELECTION GUIDE BY FUNCTION

Type No.	Applications					Features										Max. Rating		PKG Outline
	Frequency Band	Function	Set Power (W)	Use M	Use P	f	Po	Gp	ηt	Pin	Vcc	VBB	ρin	2fo	3fo	Vcc	Po	
						MHz	W	dB	%	mW	V	V	–	dBc	dBc	V	W	
M67755L ＊4 M67755H ＊4	VHF 140 MHz	FM	5		○	135~150 150~175	7	35.4	40	2	7.2	5	2.5	-25	-30	9	10	H12
M67748L/LR ＊5 M67748H/HR ＊5 M67748UH ＊5		FM	5		○	135~150 150~175 220~225	7	25.4	40	20	12.5	5	2.5	-20	-25	15	9	H27
M67798L ★★		FM	5		○	144~148	7	25.4	50	20	9.6	3.5	3	-25	-30	16	10	＊1
M67704 ＊6		FM	10	○		142~175	13	28.1	40	20	12.5	5	2.5	-20	-30	16	20	H16
M67741L ＊7 M67741H ＊7		FM	25	○		135~150 150~175	30	21.7	40	200	12.5	–	3.3	-25	-30	17	35	H2
M67781L M67781H		FM	35	○		135~160 150~175	40	21.2	40	300	12.5	–	3	-30	-30	16	50	H2
M68702L ★★ M68702LR ★★ M68702H ★★		FM	50	○		135~160 135~160 150~160	60	23.0	40	300	12.5	–	3	-30	-30	17	70	H2
M67799M ★★	UHF 400 MHz	FM	5		○	430~450	7	25.4	45	20	9.6	3.5	3	-25	-30	16	10	＊1
M67749GL ★★ M67749EL ★★ M67749SLR M67749SL ★★ M67749ULR M67749LRI ★★ M67749L/LR M67749M/MR M67749H/HR M67749UH★★/UHR M67749SH/SHR★★		FM	5		○	326~346 335~360 335~360 350~370 360~390 390~420 400~430 430~450 440~470 470~490 490~512	7	25.4	35	20	12.5	5	2.5	-20	-25	15	10	H27
M67729L2		FM	15	○		400~420	20	21.2	35	150	12.5	–	2.8	-30	-30	16	30	H18
M57788L M57788H M57788UH M57788SH		FM	35	○		400~430 450~470 470~490 490~512	40	21.2	40	300	12.5	–	3.5	-30	-30	17	50	H3
M68703M ★★		FM	50	○		430~450	60	23.0	40	300	12.5	–	3	-30	-30	17	70	H3

Note. ★★ Under development, M : for MOBILE, P : for PORTABLE. PKG outline : see references "Package outline".
Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.

＊1 : MOSFET 30 × 10mm
＊2 : 6pin type
＊3 : MCA Handy
＊4 : High gain type to M57785 series
＊5 : High gain, small package type to M57732, M57796 series
＊6 : High gain, small package type to M57719
＊7 : Wide band to M57741 series

SELECTION GUIDE BY FUNCTION

Type No.	Applications			Features								Max. Rating		PKG Outline
	Frequency Band	Function	Set Power (W)	f	Po	Pin	VOP	ηt	ρin	2fo	3fo	Vcc	Po	
				MHz	W	mW	V	%	–	dBc	dBc	V	W	
M67729L2	400MHz	FM	15	400~420	20	150	12.5/12.5	35	2.8	– 30	– 30	16	30	H18
M67729H2				450~460	20	150	12.5/12.5	35	2			16	30	H18
M57734				453~458	25	300	12.5/12.5/12.5	40	2.5			17	35	H3
M57782	AMPS	FM	3	824~849	7	1	8/8/12.5	35	2.8	– 30	– 30	17	10	H11
M67754					6	1	8/8/12.5						10	H11
M57739C					6	30	12.5/12.5						12	H26
M67724		FM	0.6	824~849	1.6	1	7.2/7.2/7.2					9	3	H25
M67717	ETACS	FM	3	872~905	7	1	8/8/12.5	35	2.8	– 30	– 30	17	10	H11
M67759					6	1	8/8/12.5							
M57791	TACS	FM	3	890~915	7	1	8/8/12.5	35	2.8	– 30	– 30	17	10	H11
M57789	NMT900	FM	6	890~915	12	5	12.5/8/12.5	30	2.8	– 30	– 30	17	20	H3
M67769C					13	1	8/8/12.5						18	H3
M67747A	DDI	FM	3	898~925	7	1	8/8/12.5	35	2.8	– 30	– 30	17	10	H11
M67764	CRP	FM	4	940~960	8	2	8/12.5/12.5	35	2.8	– 30	– 30	17	10	H11
M67790			2	945~951	4	1	6/8/8	30	3	– 30	– 30	10	6	H11
M67766A	D-AMPS	PSK	3	824~849	6	2	8/8/8/12.5	20	3	– 30	– 30	15.5	10	H3 * 8

Note. M : for MOBILE, P : for PORTABLE. PKG outline : see references "Package outline".
Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.
* 8 : 6pin type

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SELECTION GUIDE BY FUNCTION

Type No.	Applications					Features										Max. Rating		PKG Outline
	Frequency Band	Function	Set Power (W)	Use M	Use P	f	Po	G_P	ηt	P_{in}	Vcc	V_{BB}	ρ_{in}	2fo	3fo	Vcc	Po	
						MHz	W	dB	%	mW	V	V	–	dBc	dBc	V	W	
M57735	VHF6m	SSB	10	○		50~54	19	19.7	40	200	12.5	9	2.2	-25	-30	17	25	H3
M67743L M67743H	VHF MID BAND	FM	5		○	68~81 77~88	7	23.6	38	30	12.5	5	4	-18	-25	15	10	H13
M67742		FM	25	○		68~88	30	17.7	40	500	12.5	–	3	-25	-30	17	40	H2
M57785L M57785M M57785H	VHF 140 MHz	FM	5		○	135~150 150~162 162~174	7	21.4	40	50	7.2	5	2.5	-20	-30	10	10	H12
M67755L *9 M67755H *9						135~150 150~175	7	35.4	40	2	7.2	5	2.5	-25	-30	9	10	H12
M57783L M57783H		FM	5		○	135~160 150~175	7	21.4	45	50	7.5	5	2.5	-20	-30	9	10	H13
M67710L M67710H		FM	5		○	135~160 150~175	7	21.4	40	50	9.6	5	2.5	-20	-30	16	10	H13
M57796MA M57796L M57796H		FM	5		○	144~148 135~150 150~175	7	15.4 13.6 13.6	50	200 300 300	12.5	5	2.5	-20	-30	16	10	H14
M57732L M57732		FM	5		○	135~160 144~175	7	25.4	40	20	12.5	5	2.5	-20	-30	16	10	H12
M67748L *10 M67748LR *10 M67748H *10 M67748HR *10		FM	5		○	135~150 135~150 150~175 150~175	7	25.4	40	20	12.5	5	2.5	-20	-25	15	9	H27 H27R H27 H27R
M57706L M57706		FM	5	○		135~145 145~175	8	16.0	35	200	12.5	–	4	-15	-25	17	14	H2
M57715 M57715R M57747		FM	10	○		144~148	13	18.1	48	200	12.5	–	2.8	-25	-30 -30 -35	17	20	H2 H2R H6
M57713 *11		SSB	10	○		144~148	17	19.2	40	200	12.5	9	2.2	-25	-30	17	26	H3
M67704 *12		FM	10	○		142~175	13	28.1	40	20	12.5	5	2.5	-20	-30	16	20	H16
M57719L M57719N M57719		FM	10	○		135~145 142~163 145~175	14	18.4	40	200	12.5	–	4	-25	-35	17	20	H2
M57710-A *13		FM	25	○		156~160	28	21.4	45	200	12.5	–	2.8	-25	–	17	40	H2
M57737		FM	25	○		144~148	30	21.7	45	200	12.5	–	2.8	-25	-30	17	40	H2
M57727 *11		SSB	25	○		144~148	37	20.9	50	300	12.5	9	2.2	-25	-30	17	40	H3

Note. M : for MOBILE, P : for PORTABLE. PKG outline : see references "Package outline".
Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.

* 9 : High gain type to M57785 series
* 10 : High gain, small package type to M57732, M57796 series
* 11 : All mode type
* 12 : High gain, small package type to M57719 series
* 13 : For Marine Radio

SELECTION GUIDE BY FUNCTION

Type No.	Applications					Features										Max. Rating		PKG Outline
	Frequency Band	Function	Set Power (W)	Use M	Use P	f	Po	Gp	ηt	Pin	Vcc	VBB	ρin	2fo	3fo	Vcc	Po	
						MHz	W	dB	%	mW	V	V	–	dBc	dBc	V	W	
M57741UL	VHF 140 MHz	FM	25	○		135~148	28	21.4	40	200	12.5	–	3.3	-25	-30	17	35	H2
M57741L						146~160		21.4		200								
M57741M						156~168		20.4		250								
M57741H						164~175		19.7		300								
M67741L ＊14		FM				135~150	30	21.7	40	200	12.5	–	3.3	-25	-30	17	35	H2
M67741H ＊14						150~175												
M67781L		FM	35	○		135~160	40	21.2	40	300	12.5	–	3	-30	-30	17	50	H2
M67781H						150~175		21.2										
M57726		FM	35	○		144~148	43	20.3	50	400	12.5	–	2.8	-35	-45	17	55	H2
M57726R																		H2R
M67727 ＊15		SSB	45	○		144~148	60	20.7	50	500	12.5	9	2.8	-30	-35	16	78	H17
M67702		FM	50	○		150~175	60	10.7	40	5000	12.5	–	2.8	-30	-35	17	90	H17
M67785	VHF BAND Ⅲ	FM	3		○	186~200	5	24.0	40	20	9.6	5	2.5	-25	-30	13	6	H12
M67785H						220~240									-25			
M67713		FM	5		○	220~225	7	12.4	45	500	12.5	5	2.5	-20	-30	16	10	H14
M67723								25.4		20								H13
M67730L		FM	25	○		175~200	30	20.0	43	300	12.5	–	2.8	-30	-35	17	40	H2
M57774		FM	25	○		220~225	30	20.0	43	300	12.5	–	2.8	-30	-35	17	40	H2
M67712 ＊15		SSB										9						H3
M57786UL	UHF 400 MHz	FM				360~380	6	20.7	38	50	7.2	5	2.5	-25	-30	10	10	H12
M57786L						400~430	7	21.4	40									
M57786M						430~470	7	21.4	40									
M57786H						470~512	7	21.4	40									
M57799L1		FM				335~360		21.7	35				3					
M57799L2						360~400		21.7	35				3					
M57799L			5		○	400~430	6	21.7	40	40	7.5	5	2.5	-25	-30	9	9	H13
M57799M						430~470		21.7	40				2.5					
M57799H						470~512		21.7	40				2.5					
M67705UL		FM				380~400	7	25.4	40	20	9.6	5	2.5	-25	-30	13	10	H13
M67705L						400~430												
M67705M						430~470												
M67705H						470~512												

Note. M : for MOBILE, P : for PORTABLE. PKG outline : see references "Package outline".
Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.
＊14 : High power, wide band type to M57741 series
＊15 : All mode type

SELECTION GUIDE BY FUNCTION

Type No.	Applications					Features										Max. Rating		PKG Outline
	Frequency Band	Function	Set Power (W)	Use M	Use P	f	Po	Gp	ηt	Pin	Vcc	VBB	ρin	2fo	3fo	Vcc	Po	
						MHz	W	dB	%	mW	V	V	–	dBc	dBc	V	W	
M57797MA	UHF 400 MHz	FM	5		○	430~450	7	18.4	40	100	12.5	5	2.5	-25	-30	16	10	H14
M57797SL						350~380		15.4		200			4.4					
M57797UL						380~400		15.4		200			2.5					
M57797L						400~430		15.4		200			2.5					
M57797H						450~470		15.4		200			2.5					
M57797UH						470~490		15.4		200			2.5					
M57797SH						490~512		15.4		200			2.5					
M57721L		FM				350~400	7	28.4	40	10	12.5	5	2.5	-30	-35	16	10	H12
M57721M						400~450												
M57721						450~512												
M67749SLR *16		FM				335~360	7	25.4	35	20	12.5	5	2.5	-25	-30	15	10	H27
M67749ULR *16						360~380												
M67749L *16						400~430												
M67749LR *16						400~430												
M67749M *16						430~450												
M67749MR *16						430~450												
M67749H *16						450~470												
M67749HR *16						450~470												
M67749UHR *16						470~490												
M67749SHR *16★★						490~512												
M57714EL		FM	5	○		335~360	7	18.4	38	100	12.5	–	2	-30	-30	17	12	H3
M57714SL						360~380												
M57714UL						380~400												
M57714L						400~420												
M57714M						430~450												
M57714						450~470												
M57714UH						470~490												
M57714SH						490~512												
M67709L *17		FM	10	○		350~390	13	31.1	35	10	12.5	5	2.8	-30	-30	16	20	H16
M67709M *17						390~430												
M67709H *17						430~470												
M67709SH *17						470~512												

Note. ★★ Under development, M : for MOBILE, P : for PORTABLE. PKG outline : see references "Package outline".
Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.
* 16 : High gain, small package type to M57721, M57797 series
* 17 : High gain, small package type to M57704 series

MITSUBISHI ELECTRIC

SELECTION GUIDE BY FUNCTION

Type No.	Applications: Frequency Band	Applications: Function	Applications: Set Power (W)	Use: M	Use: P	Features: f (MHz)	Po (W)	Gp (dB)	ηt (%)	Pin (mW)	Vcc (V)	VBB (V)	ρin (–)	2fo (dBc)	3fo (dBc)	Max. Rating: Vcc (V)	Max. Rating: Po (W)	PKG Outline
M57704EL	UHF 400 MHz	FM	10	○		335~360	13	18.1	35	200	12.5	–	2.8	-30	-30	17	20	H3
M57704SL						360~380			35									
M57704UL						380~400			35									
M57704L						400~420			35									
M57704M						430~450			35									
M57752 ∗18						430~450			40									
M57704MR ∗20						430~450			35									
M57704H						450~470			35									
M57704UH						470~490			35									
M57704SH						490~512			35									
M57716 ∗19		SSB	10	○		430~450	17	19.2	35	200	12.5	9	2.5	-30	-30	17	128	H3
M67729L2		FM	15	○		400~420	20	21.2	35	150	12.5	–	2.8 2	-30	-30	16	30	H18
M67729H2						450~460												
M57734		FM	15	○		453~458	25	19.2	40	300	12.5	–	2.5	-30	-30	17	35	H3
M57729EL		FM	25	○		335~360	30	20.0	40	300	12.5	–	2.8	-30	-30	17	40	H3
M57729SL						360~380												
M57729UL						380~400												
M57729L						400~420												
M57729						430~450												
M57729H						450~470												
M57729UH						470~490												
M57729SH						490~512												
M57745 ∗19		SSB	25	○		430~450	33	20.4	40	300	12.5	9	2.5	-30	-30	17	40	H3
M57788L		FM	35	○		400~430	40	21.2	40	300	12.5	–	3.5	-30	-30	17	50	H3
M57788M						430~450	45	20.5		400	13.5		2.8					
M57788MR ∗20						430~450	45	20.5		400	13.5		2.8					
M57788H						450~470	40	21.2		300	12.5		3.5					
M57788UH						470~490	40	21.2		300	12.5		3.5					
M57788SH						490~512	40	21.2		300	12.5		3.5					
M67703H		FM	45	○		450~470	50	7.0	40	10W	12.5	–	2.8	-30	-35	17	80	H17
M67703UH						470~490												
M67703SH						490~512												
M67728		SSB	45	○		430~450	60	7.7	40	10W	12.5	9	2.8	-30	-35	16	78	H17

Note. M : for MOBILE, P : for PORTABLE. PKG outline : see references "Package outline".
Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.
∗18 : High effciency type
∗19 : All mode type
∗20 : Reverse pin type

SELECTION GUIDE BY FUNCTION

Type No.	Applications					Features										Max. Rating		PKG Outline
	Frequency Band	Function	Set Power (W)	Use M	Use P	f MHz	Po W	Gp dB	ηt %	Pin mW	Vcc V	VBB V	ρin –	2fo dBc	3fo dBc	Vcc V	Po W	
M57775 M57776	UHF 800 MHz	FM	Exiter Use	○		806~866 890~915	0.2 0.3	23.0	*21	1 1.5	8	–	3.0 2.8	-30	-30	15	0.8 0.6	H8
M67706 M67706U		FM	2		○	806~870 896~941	4	16.0	30	100	7.5	–	4	-30	-30	10 9	5	H13
M67776L M67776H		FM	3		○	806~870 896~941	5	37.0	30	1	7.2	–	3	-30	-30	9.2	8	H11
M57755		FM	8	○		806~866	10	20.0	35	100	12.6	–	2.8	-30	-30	17	16	H3
M67736		FM	10	○		896~941	12	33.8	30	5	12.5	8	2.8	-30	-30	17	20	H3
M57764		FM	15	○		806~825	20	16.9	30	400	12.5	–	2.8	-30	-30	17	25	H3
M57792		FM	15	○		806~870	20	16.9	30	400	13.5	–	2.8	-30	-30	17	30	H3
M57749 *22		FM	5	○		903~905	7	15.4	30	200	12.5	–	2.5	-30	-30	17	10	H3
M57793 *22		FM	5	○		903~905	7	38.5	35	1	12.5	–	2.5	-30	-30	17	10	H11
M67745		FM	5	○		846~903	7	35.4	35	2	12.5	–	2.8	-30	-30	17	10	H11
M67761		FM	5		○	893~901	7	38.5	35	1	7.2	–	2.5	-30	-30	9.2	9	H11
M67784		FM	3		○	889~915	3.8	35.7	35	1	9.6	–	2.8	-30	-30	12	6	H25
M57744		FM	10	○		889~915	13	16.3	30	300	12.5	–	2.5	-25	-30	17	18	H3
M67783 *23	UHF 1.2 GHz	FM	1		○	1240~1300	1.4	23.0	20	7	7.2	–	3.5	-28	–	15	2.5	H27
M67715 *24		SSB	1		○	1240~1300	1.2	20.7	18	10	8	8	2.5	-30	-35	16	4	H13
M67732 *25		FM	1		○	1240~1300	1	21.5	25	7	7.2	–	2.5	-30	–	16	2	H13
M67711		FM	10	○		1240~1300	16	12.0	30	1000	12.5	9	2.0	-45	–	17	20	H3
M57762		SSB	10	○		1240~1300	18	12.5	30	1000	12.5	9	2.0	-45	–	17	20	H3
M67775	UHF 1.4 GHz	FM	5	○		1465~1477	7.5	35.7	30	2	13.5	8	2.8	-25	-30	16	10	H3

Note. M : for MOBILE, P : for PORTABLE. PKG outline : see references "Package outline".
Specifications are shown in minimum values. Please refer to each spec. sheet for precise information.

* 21 : It ≤ 230mA @ Po = 0.2W
* 22 : Personal radio
* 23 : Small package type
* 24 : Driver stage for M57762
* 25 : Driver stage for M67711

MITSUBISHI ELECTRIC

SELECTION GUIDE BY FUNCTION

FOR CITIZEN'S BAND TRANSCIEVER, 27MHz 12V SERIES (Tc = 25℃)

Type No.	Aplication	Structure	Maximum Ratings						ICBO	Po (min)				ηc	Package outline
			VCBO (V)	VEBO (V)	Ic (A)	Pc (W)	Tj (℃)	Rth-c (℃/W)	(max) (μA)	Vcc (V)	f (MHz)	Pin (W)	(W)	(min) (%)	
2SC2086	HPA	Si, NPN, EP	75	4	1	0.8 *1	+ 135	137.5 *2	100	12	27	0.015	0.3	50	T-1B
2SC2166	HPA	Si, NPN, EP	75	5	4	12.5	+ 150	10	100	12	27	0.25	6	55	T-30
2SC1944	HPA	Si, NPN, EP	80	5	6	20	+ 150	6.25	100	12	27	1	13	55	T-30
2SC1945	HPA	Si, NPN, EP	80	5	6	20	+ 150	6.25	100	12	27	0.5	14	60	T-30E
2SC1969	HPA	Si, NPN, EP	60	5	6	20	+ 150	6.25	100	12	27	1	16	60	T-30
2SC3133	HPA	Si, NPN, EP	60	5	6	20	+ 150	6.25	100	12	27	0.5	13	60	T-30E

*1 : Ta = 25℃, *2 : Rth-a

FOR MOBILE RADIOS, 13.5V SERIES (Tc = 25℃)

2SC2097	HPA	Si, NPN, EP	50	5	15	150	+ 175	1.2	5000	13.5	30	4	75	55	T-40E
2SC3241	HPA	Si, NPN, EP	50	5	18	180	+ 175	0.83	5000	12.5	30	4	75	55	T-45E
2SC2904	HPA	Si, NPN, EP	50	5	22	200	+ 175	0.75	5000	12.5	30	7	100	55	T-40E
2SC3908	HPA	Si, NPN, EP	50	5	22	200	+ 175	0.75	5000	12.5	30	7	100	55	T-40E
2SC3240	HPA	Si, NPN, EP	50	5	25	270	+ 175	0.556	5000	12.5	30	7	100	55	T-45E

28V SERIES TO FIXED STATION APPLICATIONS (Tc = 25℃)

2SC2133 *	HPA	Si, NPN, EP	55	4	5	75	+ 175	2.0	2000	28	220	4.5	30	55	T-40E
2SC2134 *	HPA	Si, NPN, EP	55	4	10	120	+ 175	1.25	5000	28	220	12	60	55	T-40E
2SC2609 *	HPA	Si, NPN, EP	55	4	15	170	+ 175	0.88	10000	28	220	25	100	55	T-40E

* : Communication grade

150/400MHz BAND 7.2V SERIES FOR MOBILE RADIOS (Tc = 25℃)

2SC2055	HPA	Si, NPN, EP	18	4	0.3	0.5 *1	+ 135	220 *2	30	7.2	175	0.01	0.2	50	T-1B
2SC3404	HPA	Si, NPN, EP	20	3.5	1	5	+ 175	30	200	7.2	175	0.08	1.5	55	T-46
2SC3017	HPA	Si, NPN, EP	20	3.5	1	4	+ 175	37.5	200	7.2	175	0.1	1.5	55	T-8E
2SC2056	HPA	Si, NPN, EP	18	4	0.6	4	+ 175	37.5	100	7.2	175	0.2	1.6	55	T-8E
2SC3018	HPA	Si, NPN, EP	20	3.5	1.5	10	+ 175	15	300	7.2	175	0.15	3	55	T-31E
2SC3001	HPA	Si, NPN, EP	20	3.5	3	20	+ 175	7.5	500	7.2	175	0.3	6	60	T-31E
2SC4240	HPA	Si, NPN, EP	20	3.5	3	20	+ 175	7.5	500	7.2	175	0.3	6	60	T-46
2SC3629	HPA	Si, NPN, EP	20	3.5	1	5	+ 175	30	200	7.2	520	0.2	1.2	55	T-46
2SC3103	HPA	Si, NPN, EP	20	3.5	1.5	10	+ 175	15	300	7.2	520	0.6	2.8	55	T-31E
2SC3379	HPA	Si, NPN, EP	20	3.5	1.5	10	+ 175	15	300	7.2	520	0.6	2.8	55	T-46
2SC3104	HPA	Si, NPN, EP	20	3.5	3	20	+ 175	7.5	500	7.2	520	2	6	60	T-31E

*1 : Ta = 25℃, *2 : Rth-a

UHF BANDWIDTH RANGE 24V SERIES FOR LINEAR AMPLIFIER (Tc = 25℃)

2SC2797 *	HPA	Si, NPN, EP	45	4	1	10	+ 175	15	400	24	770	1	5	55	T-41
2SC2798 *	HPA	Si, NPN, EP	45	4	2	30	+ 175	5	1000	24	770	3	12	55	T-41
2SC2799 *	HPA	Si, NPN, EP	45	4	4	50	+ 175	3	1500	24	770	8	25	55	T-41E

* : Communication grade

SELECTION GUIDE BY FUNCTION

150MHz BAND 13.5V SERIES FOR MOBILE RADIOS ($T_c = 25$℃)

Type No.	Structure	Aplication	Maximum Ratings						I_{CBO}	Po (min)				η_c	Package outline
			V_{CBO} (V)	V_{EBO} (V)	I_c (A)	P_c (W)	T_j (℃)	$R_{th\text{-}c}$ (℃/W)	(max) (μA)	V_{CC} (V)	f (MHz)	P_{in} (W)	(W)	(min) (%)	
2SC2053	HPA	Si, NPN, EP	40	4	0.3	0.6 *1	+135	183 *2	20	13.5	175	0.004	0.15	40	T-1B
2SC741 *3	HPA	Si, NPN, EP	40	4	0.3	2.5	+175	60	1	13.5	150	0.01	0.2	50	T-8C
2SC2538	HPA	Si, NPN, EP	40	4	0.4	3	+135	36.7	100	13.5	175	0.05	0.5	45	T-1B
2SC730 *3	HPA	Si, NPN, EP	40	4	0.4	3	+175	50	10	13.5	150	0.1	1	50	T-8
2SC1970	HPA	Si, NPN, EP	40	4	0.6	5	+150	25	100	13.5	175	0.12	1	50	T-30
2SC1947 *4	HPA	Si, NPN, EP	35	4	1	10	+175	15	500	13.5	175	0.3	3.5	50	T-8E
2SC2627	HPA	Si, NPN, EP	35	4	2	20	+175	7.5	1000	12.5	175	0.25	5	60	T-41
2SC2237	HPA	Si, NPN, EP	35	4	2	20	+175	7.5	500	13.5	175	0.25	6	60	T-31E
2SC3628	HPA	Si, NPN, EP	35	4	2	20	+175	7.5	500	13.5	175	0.25	6	60	T-46
2SC1971	HPA	Si, NPN, EP	35	4	2	12.5	+175	10	500	13.5	175	0.6	6	60	T-30E
2SC1965 *4	HPA	Si, NPN, EP	35	4	1	15	+175	10	500	13.5	175	0.6	6	50	TC-17
2SC2539	HPA	Si, NPN, EP	35	4	4	35	+175	4.3	1000	13.5	175	0.5	14	60	T-31E
2SC1729	HPA	Si, NPN, EP	35	4	3.5	35	+175	4.3	1000	13.5	175	1.4	14	60	T-31E
2SC1972	HPA	Si, NPN, EP	35	4	3.5	25	+175	6	1000	13.5	175	2.5	14	60	T-30E
2SC2628	HPA	Si, NPN, EP	35	4	4	40	+175	3.75	2000	12.5	175	1	15	60	T-41
2SC2094	HPA	Si, NPN, EP	40	4.5	3.5	30	+175	5	2000	13.5	175	2	15	60	T-31E
2SC1946	HPA	Si, NPN, EP	35	4	7	50	+175	3	2000	13.5	175	6	28	60	T-31E
2SC1946A	HPA	Si, NPN, EP	35	4	7	50	+175	3	2000	13.5	175	3	30	60	T-31E
2SC2629	HPA	Si, NPN, EP	35	4	8	60	+175	2.5	3000	13.5	175	3.5	30	60	T-41
2SC2540	HPA	Si, NPN, EP	35	4	10	75	+175	2	2500	13.5	175	6	40	60	T-40E
2SC2630	HPA	Si, NPN, EP	35	4	14	100	+175	1.5	5000	12.5	175	10	50	60	T-40E
2SC2694	HPA	Si, NPN, EP	35	4	20	140	+175	1.07	5000	12.5	175	15	70	60	T-40E
MTH326 ★★	HPA	Si, NPN, EP	35	4	25	185	+175	0.8	5000	12.5	175	15	80	60	T-40E

*1 : $T_a = 25$℃, *2 : $R_{th\text{-}a}$

*3 : High-reliability Communication grade

*4 : Communication grade

★★ : Under development

SELECTION GUIDE BY FUNCTION

400MHz BAND 13.5V SERIES FOR MOBILE RADIOS (Tc = 25℃)

Type No.	Structure	Aplication	Maximum Ratings						ICBO	Po (min)				ηc	Package outline
			VCBO (V)	VEBO (V)	Ic (A)	Pc (W)	Tj (℃)	Rth-c (℃/W)	(max) (μA)	Vcc (V)	f (MHz)	Pin (W)	(W)	(min) (%)	
2SC3019	HPA	Si, NPN, EP	35	4	0.4	0.9	+135	166	500	12.5	520	0.02	0.5	40	T-43
2SC908 *1	HPA	Si, NPN, EP	40	4	0.5	4.3	+175	35	50	13.5	500	0.4	1	50	T-8
2SC2131 *2	HPA	Si, NPN, EP	40	4	0.6	4	+175	37.5	100	13.5	500	0.3	1.4	50	T-8E
2SC3101	HPA	Si, NPN, EP	35	4	1	10	+175	15	300	12.5	520	0.8	3	50	T-8E
2SC3630	HPA	Si, NPN, EP	35	4	1	10	+175	15	300	12.5	520	0.8	3	50	T-46
2SC1966	HPA	Si, NPN, EP	35	3.5	1	10	+175	15	100	13.5	470	0.5	3	50	T-31E
2SC3020	HPA	Si, NPN, EP	35	4	1	10	+175	15	300	12.5	520	0.3	3	50	T-31E
2SC1967	HPA	Si, NPN, EP	35	4	2	20	+175	7.5	200	13.5	470	1.5	7	50	T-31E
2SC3021	HPA	Si, NPN, EP	35	4	2	20	+175	7.5	500	12.5	520	1.2	7	50	T-31E
2SC4167	HPA	Si, NPN, EP	35	4	2	20	+175	7.5	500	12.5	520	1.2	7	50	T-46
2SC1968	HPA	Si, NPN, EP	35	4	5	40	+175	3.75	500	13.5	470	6	14	50	T-31E
2SC1968A	HPA	Si, NPN, EP	35	4	5	40	+175	3.75	500	13.5	470	4	14	50	T-31E
2SC3022	HPA	Si, NPN, EP	35	4	7	50	+175	3	2000	12.5	520	6	18	55	T-31E
2SC2695	HPA	Si, NPN, EP	35	4	10	75	+175	2	2000	13.5	520	9	28	55	T-31E
2SC2905	HPA	Si, NPN, EP	35	4	15	120	+175	1.25	2000	12.5	520	15	45	60	T-40E
2SC3102	HPA	Si, NPN, EP	35	4	18	170	+175	0.88	5000	12.5	520	20	60	60	T-40E
2SC4989	HPA	Si, NPN, EP	35	4	20	150	+175	1.00	5000	12.5	520	20	70	60	T-40E

*1 : High-reliability Communication grade
*2 : Communication grade

900MHz BAND 12.5V SERIES (Tc = 25℃)

2SC2932 *1	HPA	Si, NPN, EP	35	3	2	20	+175	7.5	2000	12.5	900	1	6	55	T-31B
2SC2933 *1	HPA	Si, NPN, EP	35	3	4	40	+175	3.75	2000	12.5	900	3	14	50	T-31B
2SC3105 *1	HPA	Si, NPN, EP	35	3	10	80	+175	1.87	5000	12.5	850	15	30	50	T-44
2SC3804 *1	HPA	Si, NPN, EP	35	3	12	100	+175	1.5	5000	13.5	850	20	40	50	T-44
2SC4624 *2	HPA	Si, NPN, EP	35	2.5	15	110	+175	1.36	5000	12.5	900	15	45	45	T-44

* : Common Base *2 : Common Emmiter

L-BAND (1.65GHz) 28V (Tc = 25℃)

2SC4838	HPA	Si, NPN, EP	50	4	2	17.5	+175	8.6	1000	28	1650	0.7	6	45	T-31B
2SC4524	HPA	Si, NPN, EP	50	4	2.5	30	+175	5	1000	28	1650	2	7	45	T-31B
2SC4525	HPA	Si, NPN, EP	50	4	5	60	+175	2.5	2000	28	1650	5	20	40	X-139
2SC4526	HPA	Si, NPN, EP	50	4	7.5	90	+175	1.7	3000	28	1650	10	28	40	X-139

* : Common Base

15V SERIES FOR CATV/MATV AMPLIFIER (Tc = 25℃)

Type No.	Structure	Aplication	Maximum Ratings						ICBO	Gp (min)				ηc	Package outline
			VCBO (V)	VEBO (V)	Ic (A)	Pc (W)	Tj (℃)	Rth-c (℃/W)	(max) (μA)	Vcc (V)	f (MHz)	Pin (W)	(dB)	(min) (%)	
2SC1324 *1	HPA	Si, NPN, EP	35	4	0.15	3	+175	50	50	15	770	0.03	9	–	T-8

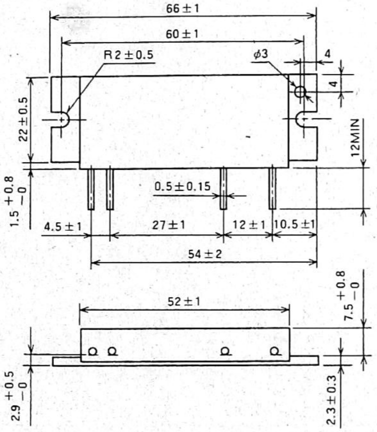
*1 : High-reliability Communication grade

OUTLINE DRAWINGS

OUTLINE DRAWING

Dimensions in mm

H2



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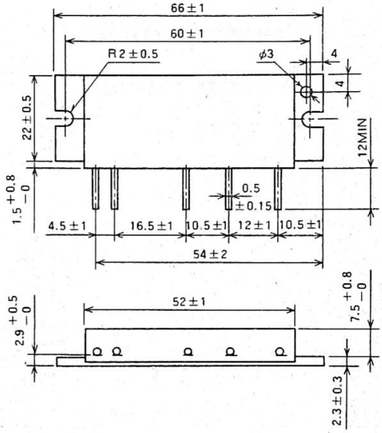

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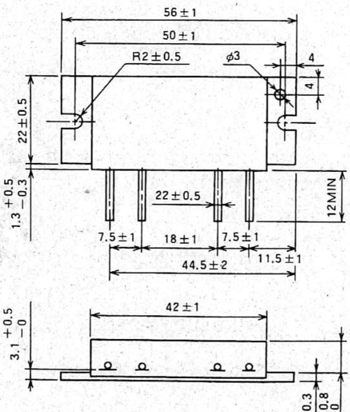

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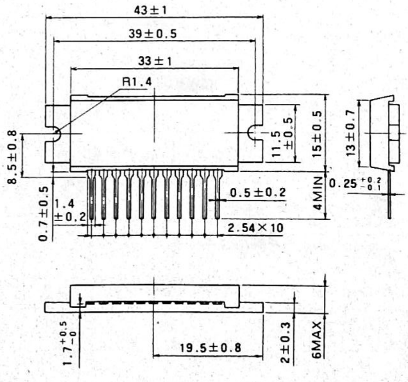


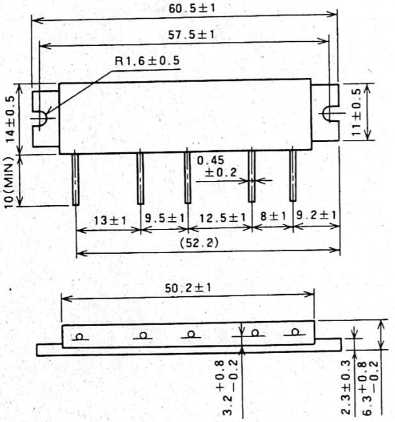
MITSUBISHI ELECTRIC

OUTLINE DRAWINGS

OUTLINE DRAWING

Dimensions in mm

H11



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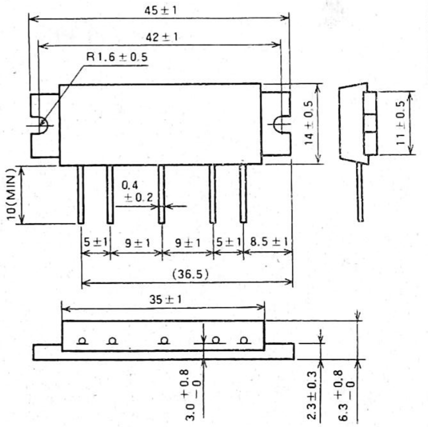

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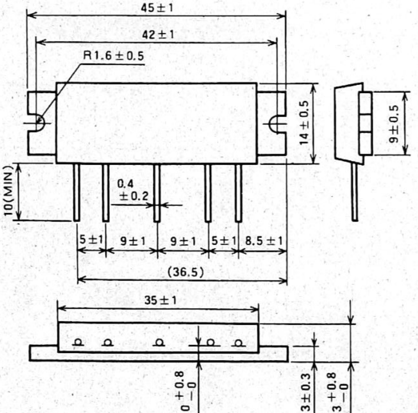

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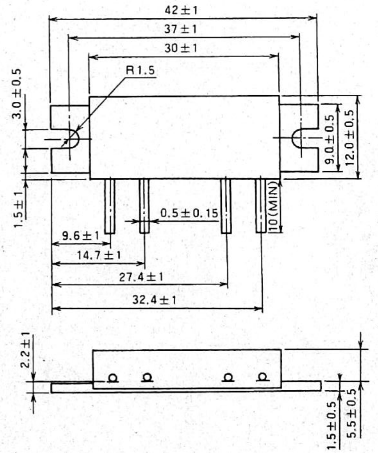
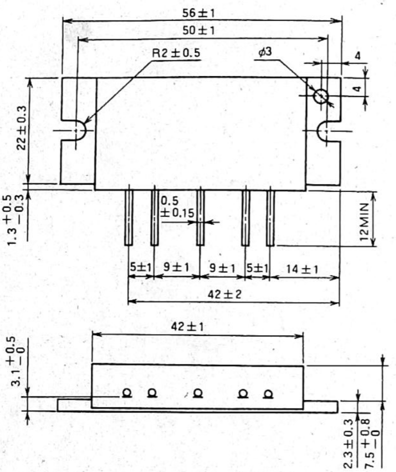


MITSUBISHI ELECTRIC

OUTLINE DRAWING

Dimensions in mm

H16



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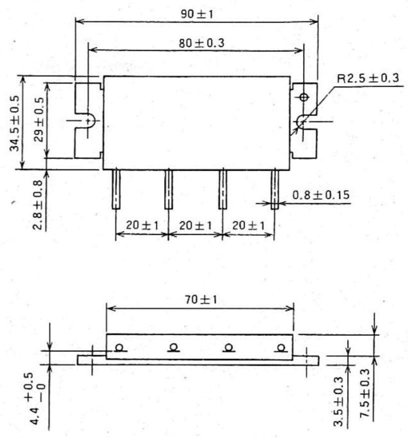

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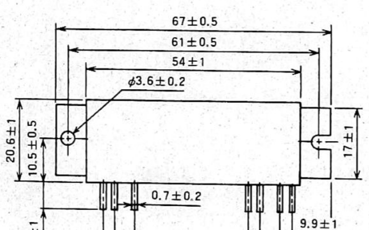

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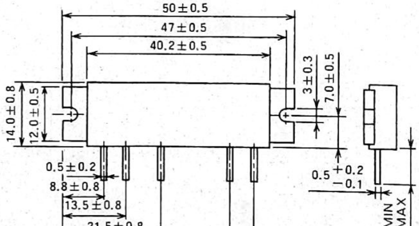
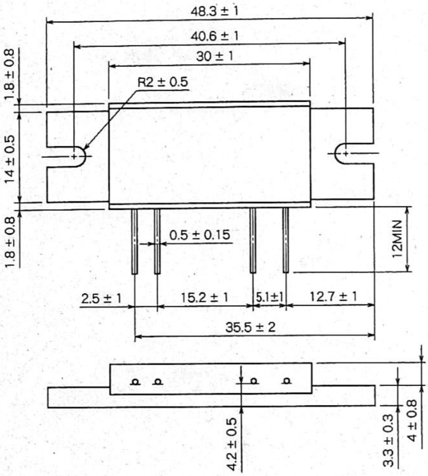


MITSUBISHI ELECTRIC

OUTLINE DRAWING

Dimensions in mm

H26



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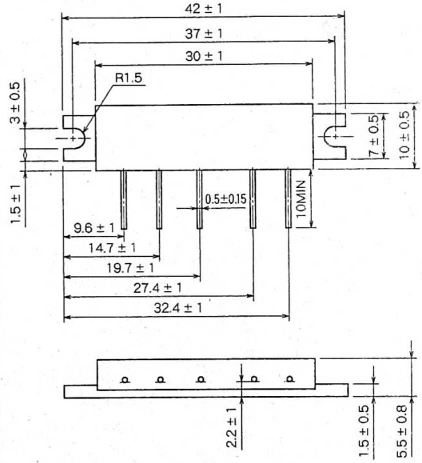

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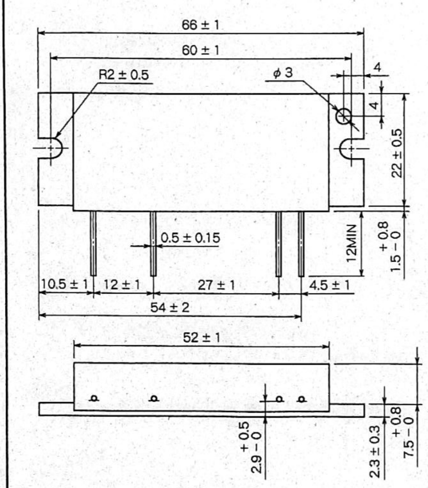

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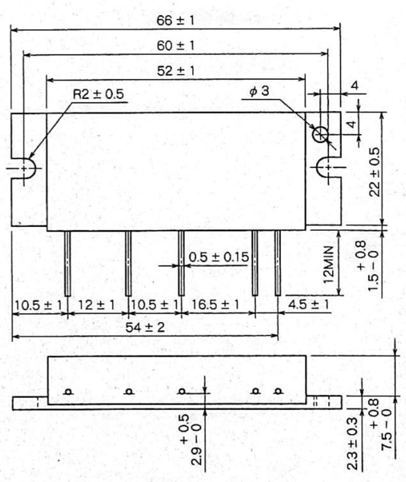
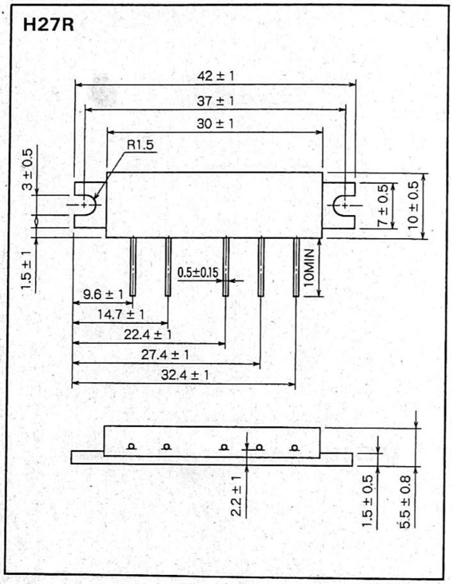


OUTLINE DRAWING

Dimensions in mm

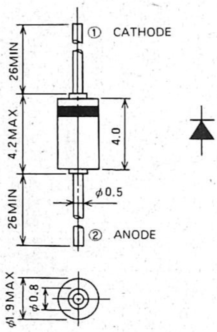


OUTLINE DRAWINGS

OUTLINE DRAWING

Dimensions in mm

D-1



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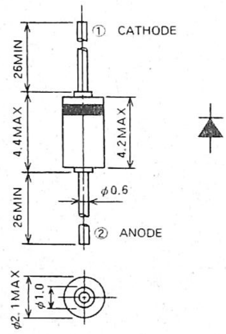
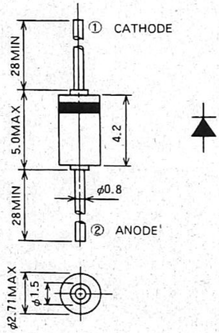


D-3



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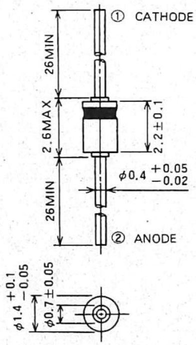
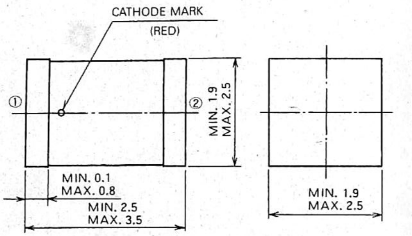


OUTLINE DRAWINGS

OUTLINE DRAWING

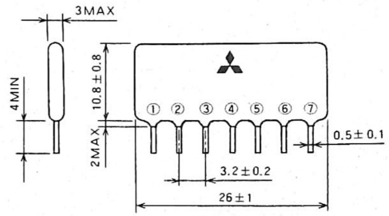
Dimensions in mm

D-6



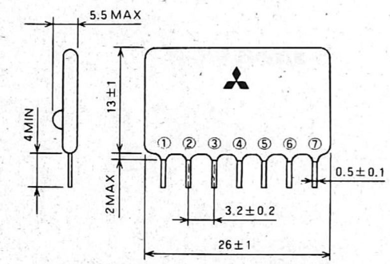
① CATHODE
② ANODE

D-7



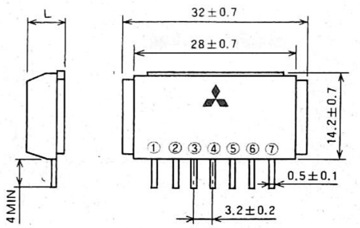
① GND TERMINAL
② RX TERMINAL
③ GND TERMINAL
④ BIAS TERMINAL
⑤ ANT TERMINAL
⑤ GND TERMINAL
⑦ TX TERMINAL

D-8



① GND TERMINAL
② RX TERMINAL
③ GND TERMINAL
④ BIAS TERMINAL
⑤ ANT TERMINAL
⑥ GND TERMINAL
⑦ TX TERMINAL

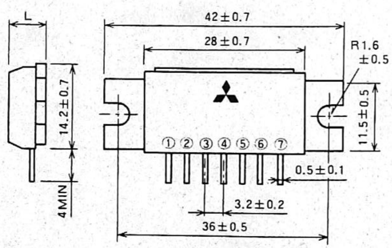
D-9



① TX TERMINAL
② GND TERMINAL
③ ANT TERMINAL
④ BIAS TERMINAL
⑤ GND TERMINAL
⑥ RX TERMINAL
⑦ GND TERMINAL

	L
a	5±0.5
b	6±0.5

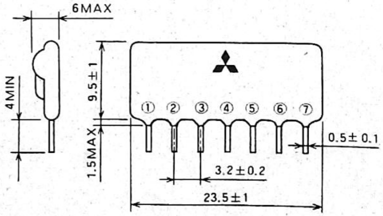
D-10



① TX TERMINAL
② GND TERMINAL
③ ANT TERMINAL
④ BIAS TERMINAL
⑤ GND
⑥ RX
⑦ GND

	L
a	5.5±0.5
b	6.5±0.5
c	9±0.5

D-11



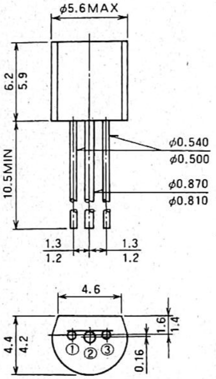
① GND TERMINAL
② RX TERMINAL
③ GND TERMINAL
④ BIAS TERMIN L
⑤ ANT TERMINAL
⑥ GND TERMINAL
⑦ TX TERMINAL

MITSUBISHI
ELECTRIC

OUTLINE DRAWING

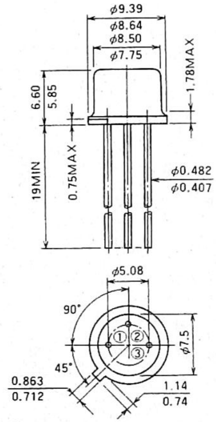
Dimensions in mm

T-1B



① EMITTER
② COLLECTOR
③ BASE

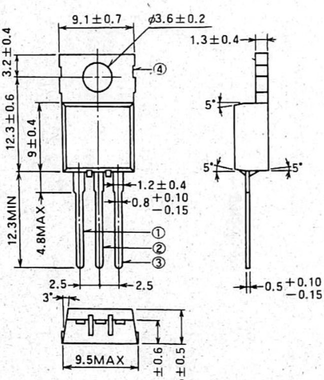
T-8



① EMITTER
② BASE
③ COLLECTOR JEDEC : TO-39

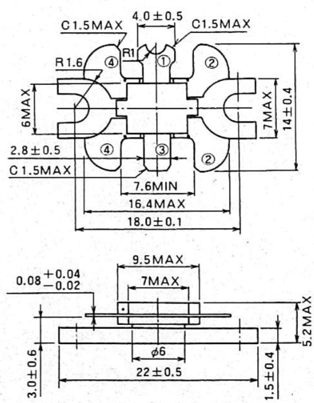
NOTE T-8C : COLLECTTOR ELECTRODE IS CONNECTED WITH CASE.
T-8E : EMITTER ELECTRODE IS CONNECTED WITH CASE.

T-30



T-30	T-30E
① BASE	① BASE
② COLLECTOR (FIN)	② EMITTER (FIN)
③ EMITTER	③ COLLECTOR
④ FIN (COLLECTOR)	④ FIN (EMITTER)

T-31

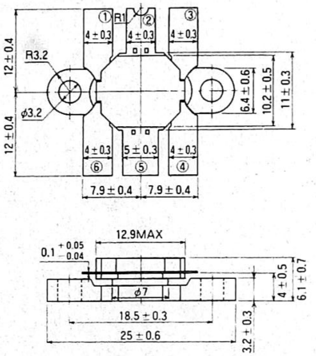


T-31E :	T-31B :
① COLLECTOR	① COLLECTOR
② EMITTER (FLANGE)	② BASE (FLANGE)
③ BASE	③ EMITTER
④ EMITTER (FLANGE)	④ BASE (FLANGE)

OUTLINE DRAWING

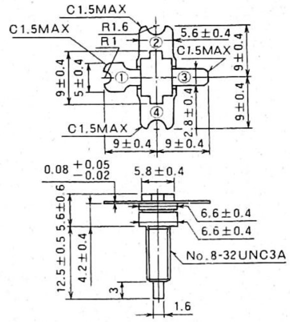
Dimensions in mm

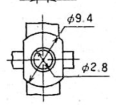
T-40



① COLLECTOR
② EMITTER
③ BASE
④ EMITTER
NOTE
T-40 : ALL ELECTRODES ARE ISOLATED FROM FLANGE.
T-40E : EMITTER ELECTRODES ARE CONNECTED WITH FLANGE.

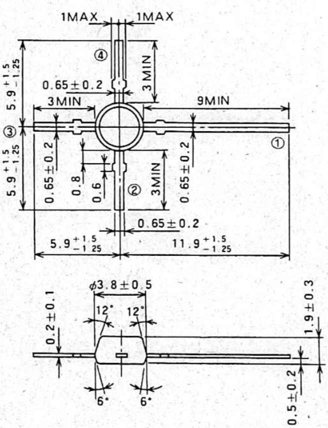
T-41





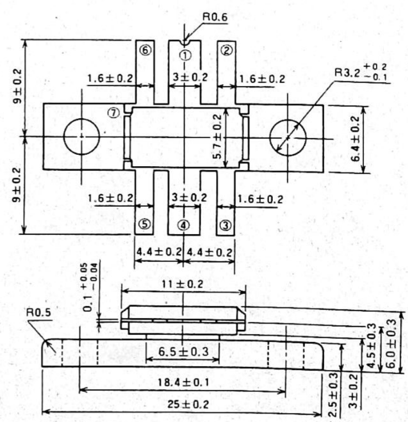
① COLLECTOR
② EMITTER
③ BASE
④ EMITTER
NOT
T-41 : ALL ELECTRODES ARE ISOLATED FROM FLANGE.
T-41E : EMITTER ELECTRODES ARE CONNECTED WITH FLANGE

T-43



① COLLECTOR
② EMITTER
③ BASE
④ EMITTER

T-44



① COLLECTOR
② BASE (FLANGE)
③ EMITTER
④ BASE (FLANGE)

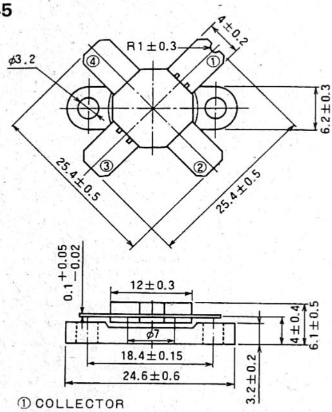
MITSUBISHI ELECTRIC

OUTLINE DRAWINGS

OUTLINE DRAWING

Dimensions in mm

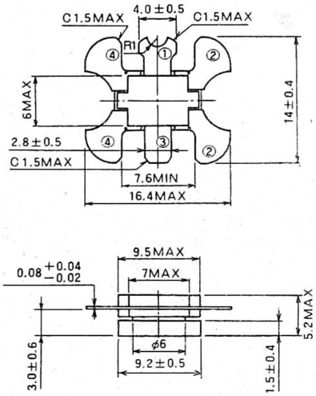
T-45



① COLLECTOR
② EMITTER
③ BASE
④ EMITTER

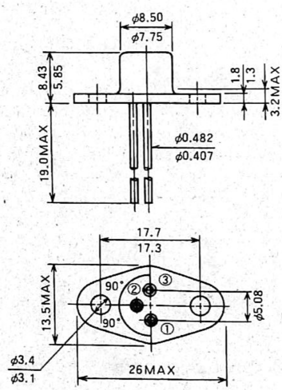
NOTE
T-45 : ALL ELECTRODES ARE ISOLATED FROM FLANGE.
T-45E : EMITTER ELECTRODES ARE CONNECTED WITH FLANGE.

T-46



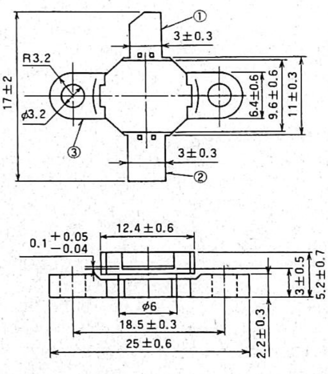
① COLLECTOR
② EMITTER (FLANGE)
③ BASE
④ EMITTER (FLANGE)

TC-17



① EMITTER (CASE)
② BASE
③ COLLECTOR

X-139



① COLLECTOR
② EMITTER
③ BASE (FLANGE)

MITSUBISHI ELECTRIC

PRECAUTIONS AND RECOMMENDATIONS

GENERAL

Mitsubishi RF Power Modules for mobile radio applications have high reliability and good performance, as they are designed and manufactured under strict quality control.
However, the reliability of semiconductor devices is remarkably affected by usage conditions such as circuit constructions, mounting method, environments, etc.. In order to keep high reliability and obtain good performance when using Mitsubishi RF Power Modules, the following important points concerning maximum ratings, handling, etc., should be noted before use.

1. MAXIMUM RATINGS

Maximum ratings of the RF Power Modules are defined by the "Absolute Maximum Ratings" shown in separate specification sheet. Maximum ratings should not be exceeded in any circumstances, even momentarily. If a device is operated in excess of the absolute maximum ratings, the device may immediately be degraded or destroyed.
Futhermore, in designing an electronic circuit using RF Power Modules, it is necessary to note that the maximum ratings of the devices should not be exceeded even if external conditions are changed.

2. NORMAL OPERATING VOLTAGE

Normal operating voltage is 12.5~13.8 volts for Mitsubishi RF Power Modules, because they are designed for mobile radio applications. The regulated 9 volts is recommended for the base biasing voltage of the modules for linear power amplifiers (for SSB).

3. THERMAL DESIGN

In order to keep high reliability of the equipment, it is better to keep the module temperature low. The case temperature of the module, when operated standard conditions, is lower than 90℃ under all severe ambient temperature, recommend normally 60℃.

4. MOUNTING and HANDLING

4-1 When the module is mounted on to a heat sink of a equipment, thermal compound to get good heat sinking should be applied between the module's fin and the heat sink. Following thermal compound for good heat sinking is recommended.

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4-2 When mounting a module to the circuit, do not apply excessive stress to the terminal leads or the fin. In particular, if there are some foreign objects between the module and the heat sink, or if there are some burrs or rising on the surface of the heat sink, it may happen that the substrate of the module will crack or break due to excessive stress from screwing the module on to the heat sink. Therefore, the surface of the heat sink in contact with the module must be as flat as possible.
When screwing a module to the heat sink, torque screw is recommended as 5 to 6kg-cm when using ϕ 3mm screws.

4-3 For soldering, the major precautions are as follows :

1) Flux ;
Roles of flux are to remove oxidized layer on the object, and prevent from oxidation during heating or lowering surface tension on the objects. Rosin flux, which is less corrosional and highly insulative, is recommended.

2) Soldering temperature ;
The temperature of the lead soldering should be lower than 260℃ and shorter than 10 seconds, or lower than 350℃ and shorter than 3 seconds.

3) Cleaning after soldering ;
The recommended solvent for cleaning the residual flux is the Ethyl Alcohol. Trichlene type solvents should not be used.

4-4 When the module is screwed after soldering the terminal leads to the circuit board, excessive stress is applied to the leads. Therefore, please solder the terminal leads to the circuit board after screwing the module to the heat sink.

4-5 If the module falls onto a hard surface, it will be damaged by mechanical shock and can no longer be used.

4-6 To obtain good stability and electrical performances, it is necessary to take precausions concerning the earth potential of the module. As the fin is the ground terminal, the fin should be connected to the ground of the set completly in RF condition.

4-7 The values of input VSWR and output VSWR of the module indicated in the specification sheet are guaranteed when the input and output leads are straight and these leads are conncected to the load 50 Ω within 10mm length. If the device is mounted under different conditions from these mentionedabove, the performances, such as output power and efficiency, may be degraded due to the impedance mismatch. In order to reform such an impedance mismatch, please set the additional matching circuits to get good impedance matching.

5. VOLTAGE SUPPLY

The modules have 2 or 3 terminals for DC power supply. If these terminals are combined without RFC (Radio Frequency Choke), or if each terminal is not bypassed with the condenser, parasitic oscillation occasionally may occured. Therefore, the DC Power Supply Terminals should be combined with RFC, and each terminal bypassed with the condensers (10μF and 4700pF in Parallel).

The first stage transistor of the module even for FM is operated in class AB. When excessively high voltage is applied to the first stage DC Power Supply Terminal, the first stage transistor may be destroyed due to current runaway. Therefore, the first stage supply voltage must be controlled, not exceeding 17 volts DC.

RF POWER MODULES

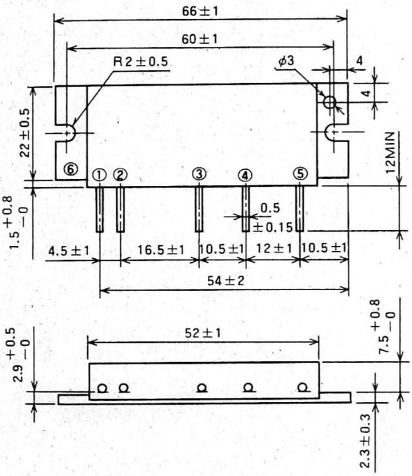
2

M57704EL

335~360MHz, 12.5V, 13W, FM MOBILE RADIO

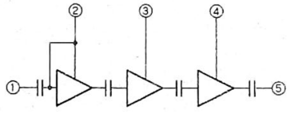
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		− 30~110	℃
T_{stg}	Storage temperature		− 40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	335	360	MHz
P_O	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			− 30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 14W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

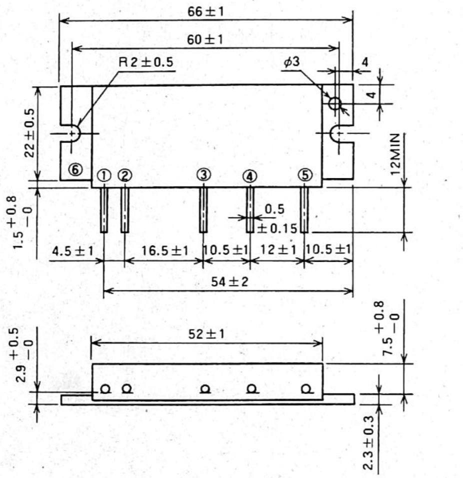
MITSUBISHI ELECTRIC

M57704SL

360~380MHz, 12.5V, 13W, FM MOBILE RADIO

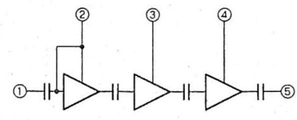
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	360	380	MHz
Po	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, Po = 14W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

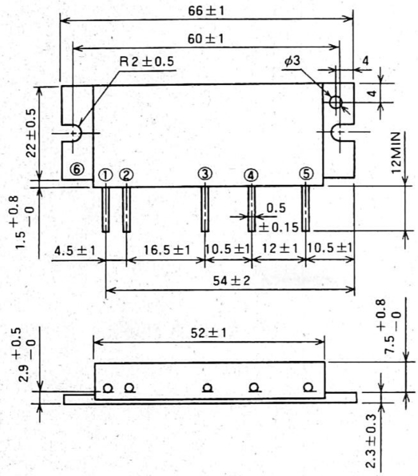
MITSUBISHI ELECTRIC

M57704UL

380~400MHz, 12.5V, 13W, FM MOBILE RADIO

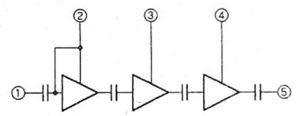
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

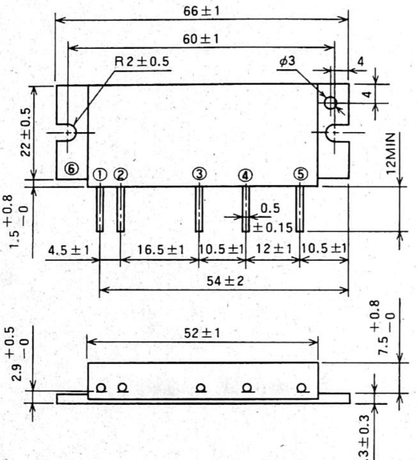
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	380	400	MHz
P_o	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_o = 14W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

MITSUBISHI ELECTRIC

M57704L

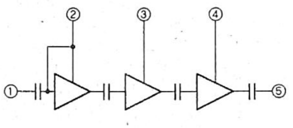
400~420MHz, 12.5V, 13W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.2W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	400	420	MHz
P_O	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_O = 14W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

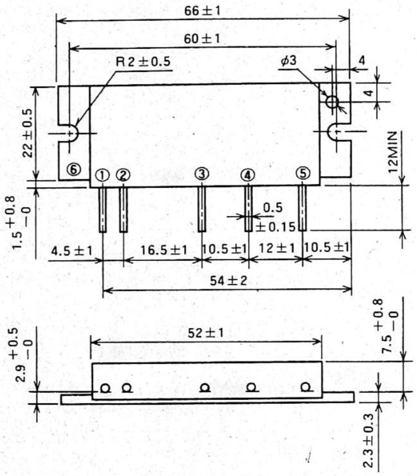
MITSUBISHI ELECTRIC

M57704M

430~450MHz, 12.5V, 13W, FM MOBILE RADIO

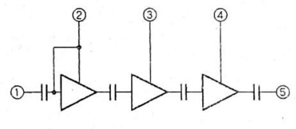
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

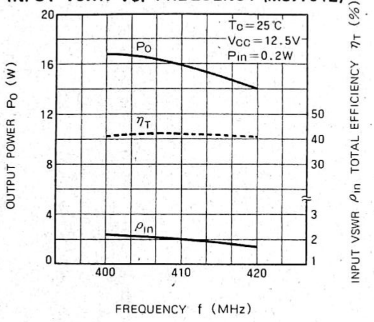
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L$ = 50 Ω	0.4	W
$P_{o(max)}$	Output power	$Z_G = Z_L$ = 50 Ω	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

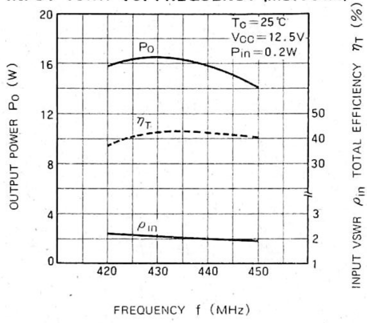
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.2W V_{CC} = 12.5V $Z_G = Z_L$ = 50 Ω	430	450	MHz
Po	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, Po = 14W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

TYPICAL PERFORMANCE DATA

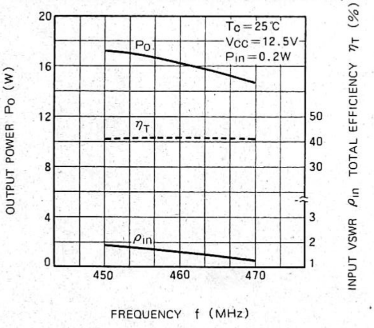
OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY (M57704L)



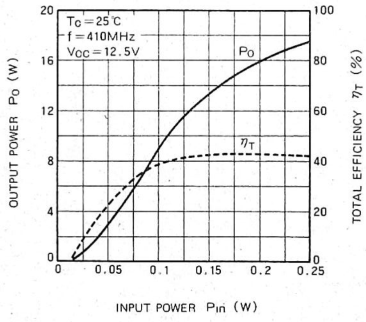
OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY (M57704M)



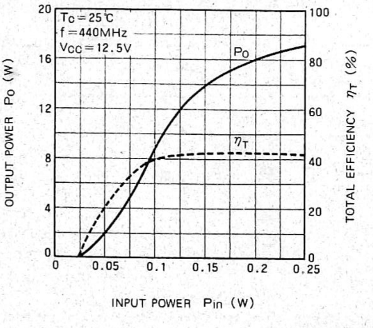
OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY (M57704H)



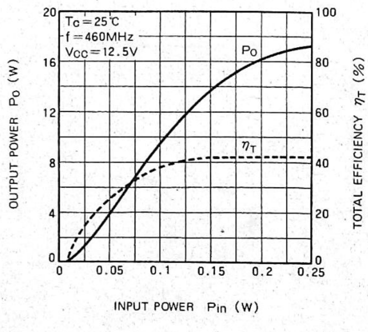
OUTPUT POWER TOTAL EFFICIENCY VS, INPUT POWER (M57704L)



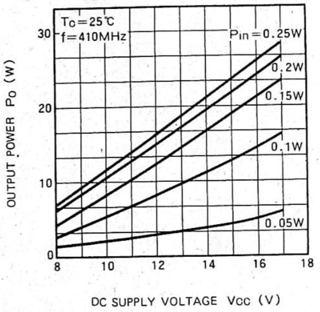
OUTPUT POWER TOTAL EFFICIENCY VS. INPUT POWER (M57704M)



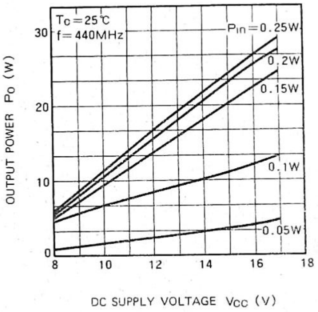
OUTPUT POWER TOTAL EFFICIENCY VS. INPUT POWER (M57704H)



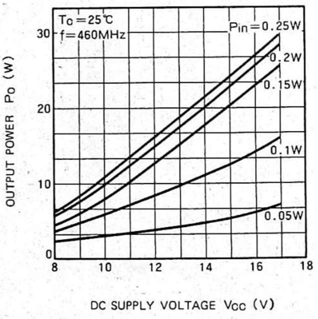
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57704L)



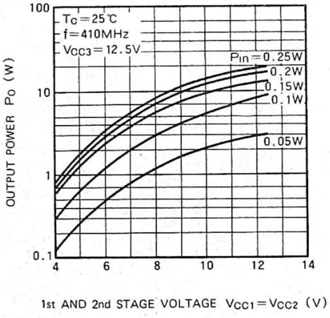
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57704M)



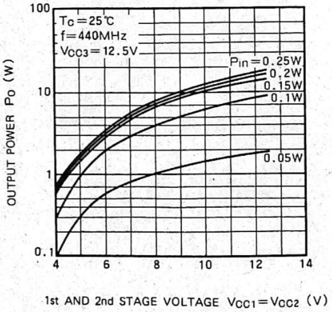
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57704H)



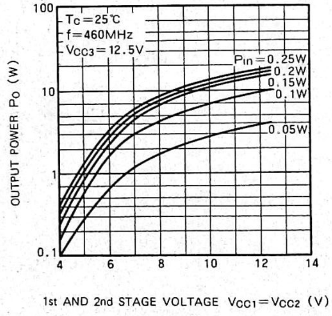
OUTPUT POWER VS. 1st AND 2nd STAGE VOLTAGE (M57704L)



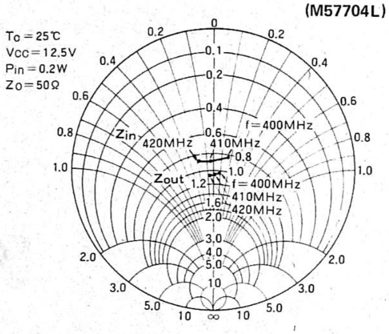
OUTPUT POWER VS. 1st AND 2nd STAGE VOLTAGE (M57704M)



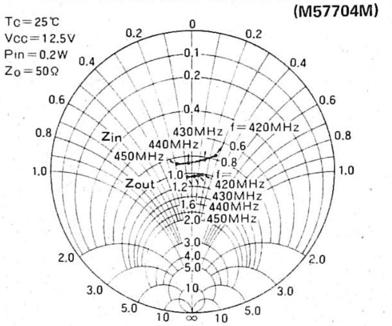
OUTPUT POWER VS. 1st AND 2nd STAGE VOLTAGE (M57704H)



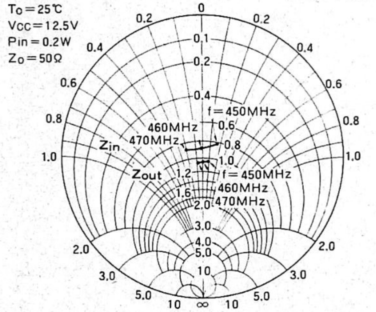
INPUT IMPEDANCE OUTPUT IMPEDANCE (M57704L)



INPUT IMPEDANCE OUTPUT IMPEDANCE (M57704M)



INPUT IMPEDANCE OUTPUT IMPEDANCE (M57704H)



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 15°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 6°C/W$ (Typ.)

c) Final stage transistor

$R_{th(j-c)3} = 2.5°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

  $P_O = 13W$, $V_{CC} = 12.5V$, $P_{in} = 0.2W$, $\eta_T = 35\%$ (minimum rating), P_{O1} (Note 1) $= 1.5W$, P_{O2} (2) $= 6W$, $I_T = 3.0A$ (I_{T1} (3) $= 0.25A$, I_{T2} (4) $= 0.75A$, I_{T3} (5) $= 2.0A$)

  Note 1: Output power of the first stage transistor
  Note 2: Output power of the second stage transistor
  Note 3: Circuit current of the first stage transistor
  Note 4: Circuit current of the second stage transistor
  Note 5: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

  $$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C^{(6)}$$
  $$= (12.5 \times 0.25 - 1.5 + 0.2) \times 15 + T_C$$
  $$= 27 + T_C\ (°C)$$

  Note 6: Package temperature of device

- Junction temperature of the second stage transistor

  $$T_{j2} = (V_{CC} \times I_{T2} - P_{O2} + P_{O1} \times R_{th(j-c)2} + T_C$$
  $$= (12.5 \times 0.75 - 6 + 1.5) \times 6 + T_C$$
  $$= 29 + T_C\ (°C)$$

- Junction temperature of the final stage transistor

  $$T_{j3} = (V_{CC} \times I_{T3} - P_O + P_{O2}) \times R_{th(j-3)} + T_C$$
  $$= (12.5 \times 2.0 - 13 + 6) \times 2.5 + T_C$$
  $$= 45 + T_C\ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep to package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the output power of 13W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(13/0.35) - 13 + 0.2}$$
$$= 1.2\ (°C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 117°C$, $T_{j2} = 119°C$, $T_{j3} = 135°C$ at $T_{j3} = 135°C$ at $Ta = 60°C$, $T_C = 90°C$.

In the annual average of ambinet temperature is 30°C,

$T_{j1} = 87°C$, $T_{j2} = 89°C$, $T_{j3} = 105°C$.

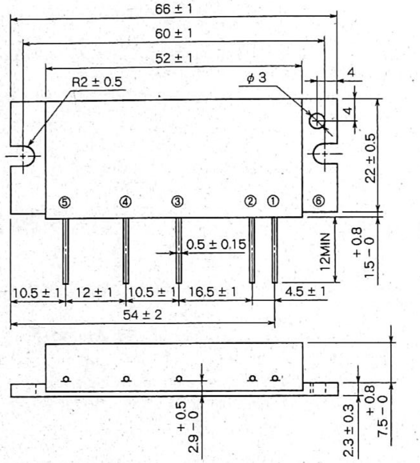
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57704MR

430~450MHz, 12.5V, 13W, FM MOBILE RADIO

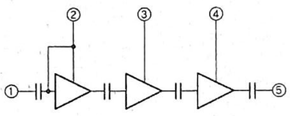
OUTLINE DRAWING

Dimensions in mm



H3R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.2W, V_{CC} = 12.5V, $Z_G = Z_L = 50\ \Omega$	430	450	MHz
P_O	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_O = 14W (P_{in} : controlled), Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

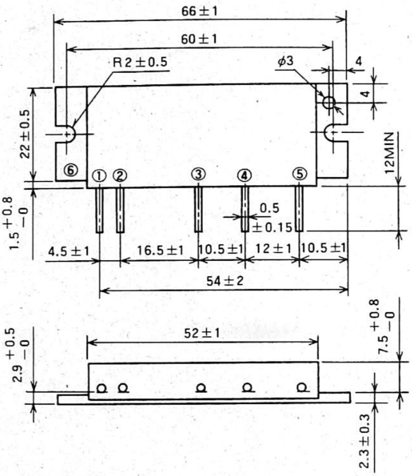
MITSUBISHI ELECTRIC

M57704H

450~470MHz, 12.5V, 13W, FM MOBILE RADIO

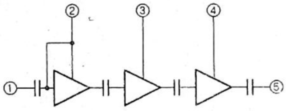
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② V_{CC1} : 1st. DC SUPPLY
③ V_{CC2} : 2nd. DC SUPPLY
④ V_{CC3} : 3rd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	450	470	MHz
Po	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 14W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

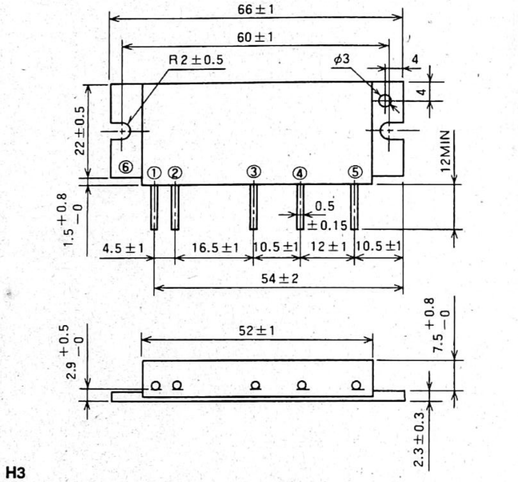
MITSUBISHI ELECTRIC

M57704UH

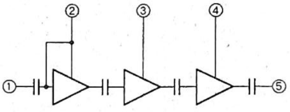
470~490MHz, 12.5V, 13W, FM MOBILE RADIO

OUTLINE DRAWING

Dimensions in mm



BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		5	A
Pin(max)	Input power	ZG = ZL = 50 Ω	0.4	W
Po(max)	Output power	ZG = ZL = 50 Ω	20	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

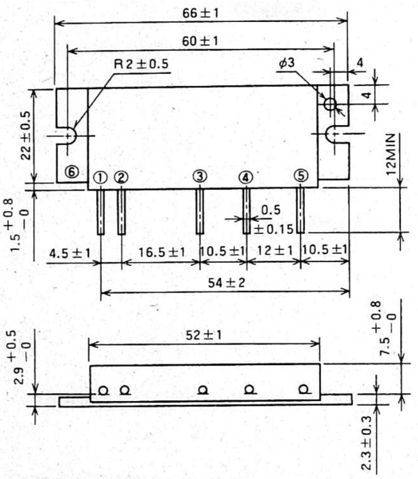
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	Pin = 0.2W Vcc = 12.5V ZG = ZL = 50 Ω	470	490	MHz
Po	Output power		13		W
ηT	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρin	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 14W (Pin : controlled) Load VSWR=20:1(All phase), 2sec. ZG = 50 Ω	No degradation		−

M57704SH

490~512MHz, 12.5V, 13W, FM MOBILE RADIO

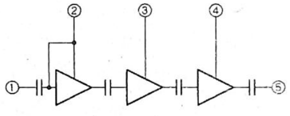
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

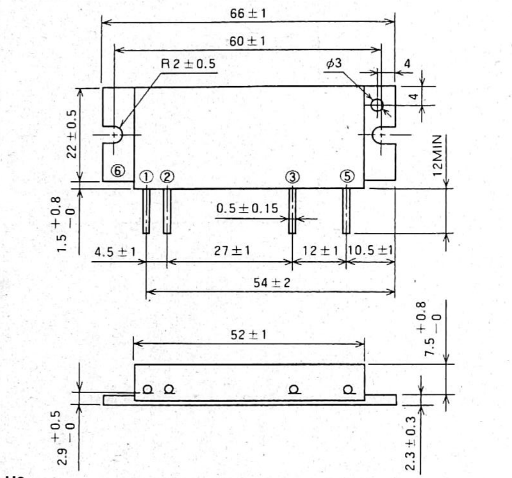
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$, $V_{CC} = 12.5V$, $Z_G = Z_L = 50\ \Omega$	490	512	MHz
P_O	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 14W$ (P_{in} : controlled), Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M57706L

135~145MHz, 12.5V, 8W, FM MOBILE RADIO

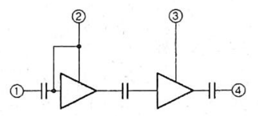
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	12	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

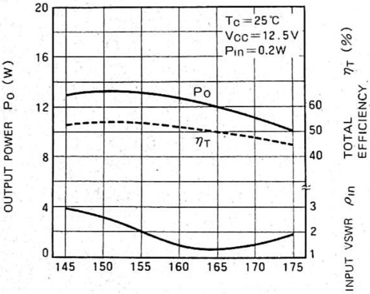
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max.	
f	Frequency range	P_{in} = 0.2W Vcc = 12.5V $Z_G = Z_L = 50\ \Omega$	135	145	MHz
Po	Output power		8		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic				dB
3fo	3rd. harmonic			−3	dB
ρ_{in}	Input VSWR			4	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 12W (P_{in} : controlled) Load VSWR=20:1 (All phase), 2sec. Z_G = 50Ω	No degradation		−

MITSUBISHI ELECTRIC

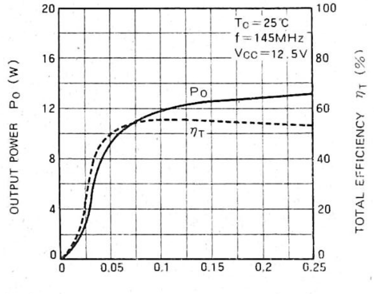
TYPICAL PERFORMANCE DATA

(Typical performance datas of M57706 are shown under, Typical performance datas of M57706L are similar to these of M57706)

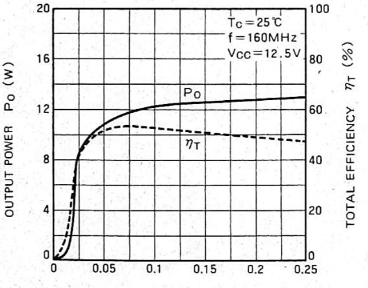
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



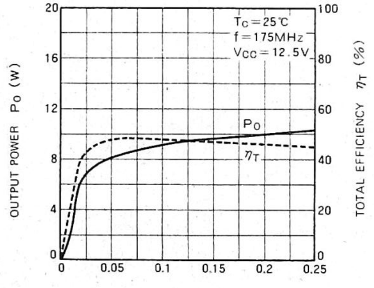
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (f = 145MHz)



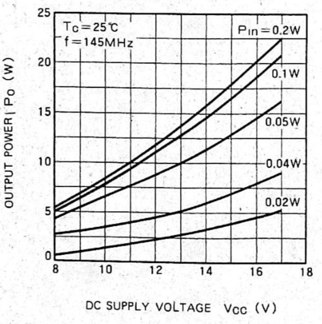
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (f = 160MHz)



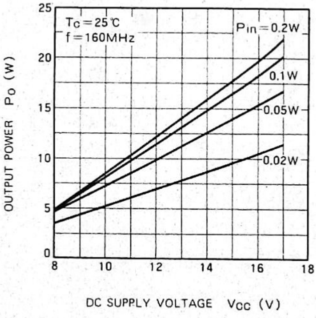
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (f = 175MHz)



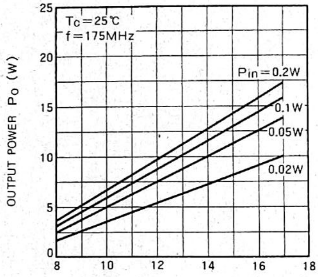
OUTPUT POWER VS. DC SUPPLY VOLTAGE (f = 145MHz)



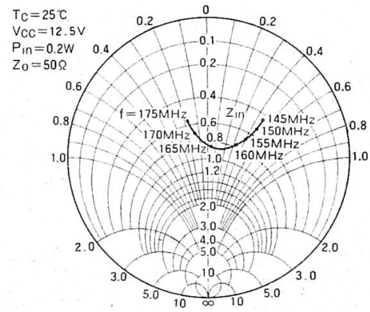
OUTPUT POWER VS. DC SUPPLY VOLTAGE (f = 160MHz)



OUTPUT POWER VS. DC SUPPLY VOTAGE (f = 175MHz)



INPUT IMPEDANCE VS. FREQUENCY



DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 10°C/W$ (Typ.)

b) Final stage transistor

$R_{th(j-c)2} = 3°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.
  P_o = 8W, V_{CC} = 12.5V, P_{in} = 0.2W, η_T = 35% (minimum rating), P_{o1} (Note 1) = 1.8W, I_T = 1.9A (I_{T1} (2) = 0.3A, I_{T2} (3) = 1.6A)
  Note 1: Output power of the first stage transistor
  Note 2: Circuit current of the first stage transistor
  Note 3: Circuit current of the final stage transistor
- Junction temperature of the first stage transistor
  $T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_{c(4)}$
  $= (12.5 \times 0.3 - 1.8 + 0.2) \times 10 + T_c$
  $= 22 + T_c$ (°C)
  Note 4: Package temperature of device
- Junction temperature of the final stage transistor
  $T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_c$
  $= (12.5 \times 1.6 - 8 + 1.8) \times 3 + T_c$
  $= 42 + T_c$ (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally T_a = 60°C) and at the output power of 8W below 90°C.

The thermal resistance $R_{th(c-a)}$ (5) of the heat sink to realize this:

$$R_{th(c-a)}^{\text{Note 5}} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(8/0.35) - 8 + 0.2}$$

$= 2.0$ (°C/W)

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

T_{j1} = 122°C, T_{j2} = 142°C at T_a = 60°C, T_c = 90°C.

In the annual average of ambient temperature is 30°C,

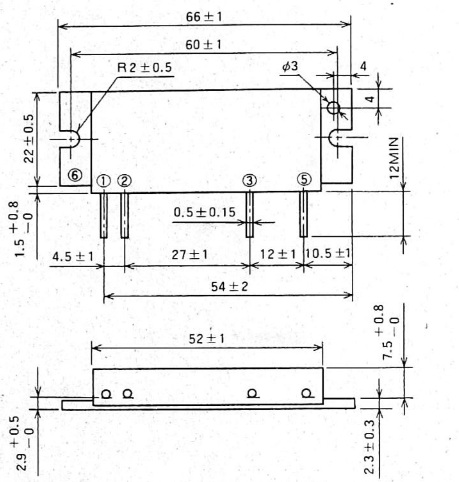
T_{j1} = 92°C, T_{j2} = 112°C

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensure.

M57706

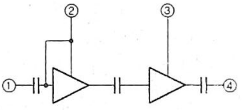
145~175MHz, 12.5V, 8W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		5	A
Pin(max)	Input power	ZG = ZL = 50 Ω	0.4	W
Po(max)	Output power	ZG = ZL = 50 Ω	12	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

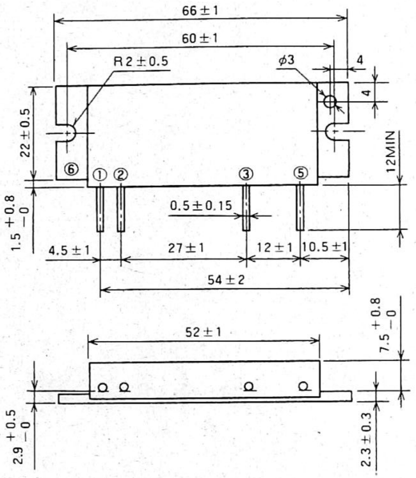
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	Pin = 0.2W Vcc = 12.5V ZG = ZL = 50 Ω	145	175	MHz
Po	Output power		8		W
ηT	Total efficiency		35		%
2fo	2nd. harmonic			−15	dB
3fo	3rd. harmonic			−25	dB
ρin	Input VSWR			4	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 12W (Pin : controlled) Load VSWR=20:1(All phase), 2sec. ZG = 50Ω	No degradation		−

MITSUBISHI ELECTRIC

M57710-A

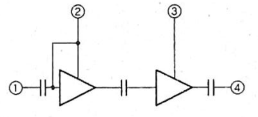
156~160MHz, 12.5V, 30W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		7	A
Pin(max)	Input power	ZG = ZL = 50 Ω	0.4	W
Po(max)	Output power	ZG = ZL = 50 Ω	40	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

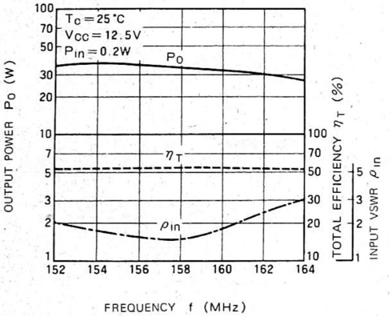
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	Pin = 0.2W Vcc = 12.5V ZG = ZL = 50 Ω	156	160	MHz
Po	Output power		30		W
ηT	Total efficiency		45		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρin	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 35W (Pin : controlled) Load VSWR=20:1(All phase), 5sec. ZG = 50Ω	No degradation		−

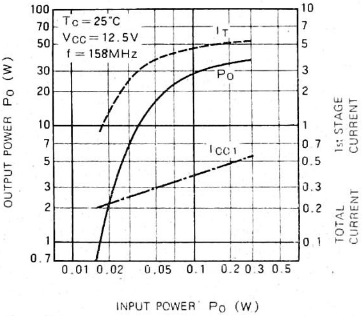
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

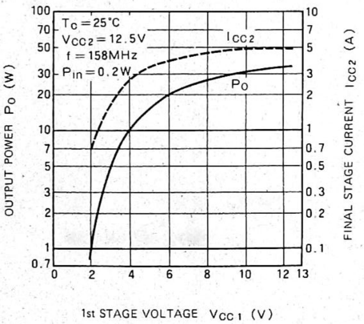
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



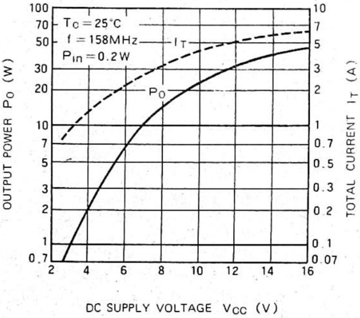
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER



OUTPUT POWER, FINAL STAGE CURRENT VS. 1st STAGE VOLTAGE



OUTPUT POWER, TOTAL CURRENT VS. DC SUPPLY VOLTAGE



DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th\,(j-c)1} = 8°C/W$ (Typ.)

b) Final stage transistor

$R_{th\,(j-c)2} = 2°C/W$ (Typ.);

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

$P_O = 28W$, $V_{CC} = 12.5V$, $P_{in} = 0.2W$, $\eta_T = 45\%$ (minimum rating), P_{O1} (Note 1) $= 5W$, $I_T = 5.0A$ (I_{T1} (2) $=$ 0.9A, I_{T2} (3) $= 4.1A$)

Note 1: Output power of the first stage transistor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th\,(j-c)1} + T_C{}^{(4)}$$
$$= (12.5 \times 0.9 - 5 + 0.2) \times 8 + T_C$$
$$= 52 + T_C\ (°C)$$

Note 4: Package temperature of device

- Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_O + P_{O1}) \times R_{th\,(j-c)2} + T_C$$
$$= (12.5 \times 4.1 - 28 + 5) \times 2 + T_C$$
$$= 57 + T_C\ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the output power of 8W below 90°C.

The thermal resistance $R_{th\,(c-a)}$ (5) of the heat sink to realize this:

$$R_{th\,(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(28/0.45) - 28 + 0.2}$$
$$= 0.87\ (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 142°C$, $T_{j2} = 147°C$ at $T_a = 60°C$, $T_C = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 112°C$, $T_{j2} = 117°C$

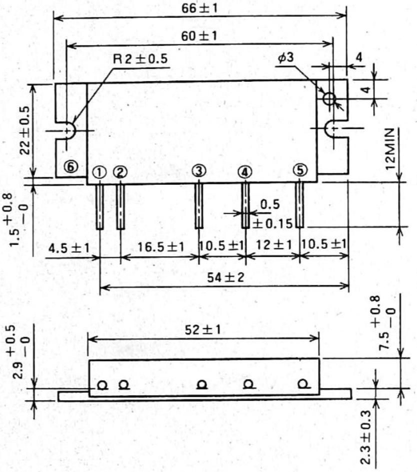
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensure.

M57713

144~148MHz, 12.5V, 17W, MOBILE SSB RADIO

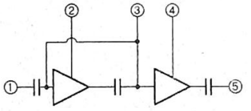
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
V_{BB}	Base bias		10	V
I_{CC}	Total current		6	A
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

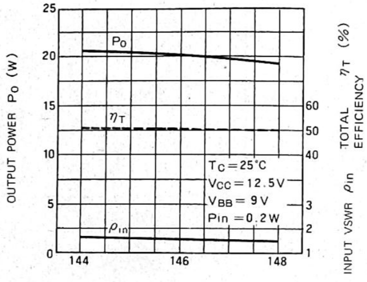
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.2W V_{CC} = 12.5V V_{BB} = 9V $Z_G = Z_L$ = 50 Ω	144	148	MHz
Po	Output power		17		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.2	−
−	Load VSWR tolerance	V_{CC} = 15.2V, V_{BB} = 9V Po = 14W (P_{in} : controlled) Load VSWR=20:1(All phase) Z_G = 50 Ω	No degradation		−

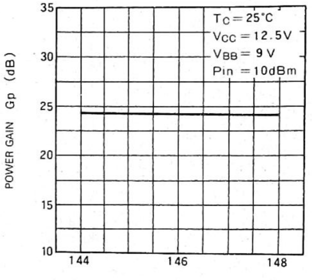
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

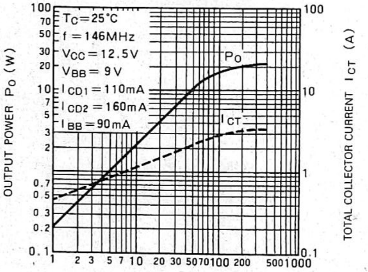
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



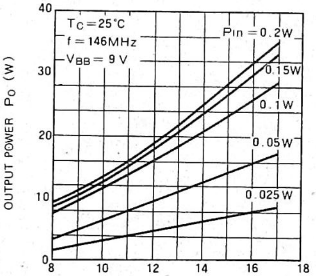
POWER GAIN VS. FREQUENCY



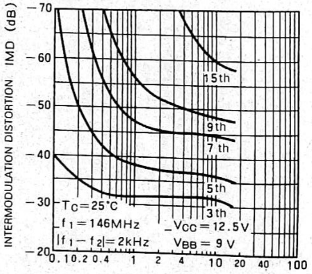
OUTPUT POWER, TOTAL COLLECTOR CURRENT VS. INPUT POWER



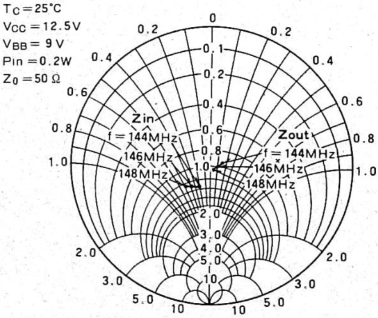
OUTPUT POWER VS. SUPPLY VOLTAGE



INTERMODULATION DISTORTION VS. OUTPUT POWER



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY



MITSUBISHI ELECTRIC

DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 10°C/W$ (Typ.)

b) Final stage transistor

$R_{th(j-c)2} = 2°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

P_o = 14W, V_{CC} = 12.5V, P_{in} = 0.07W, η_T = 40% (minimum rating), P_{o1} (Note 1) = 2.5W, I_T = 2.8A (I_{T1} (2) = 0.5A, I_{T2} (3) = 2.3A)

Note 1: Output power of the first stage transistor
Note 2: Circuit current of the first stage transistor
Note 3: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c{}^{(4)}$$
$$= (12.5 \times 0.5 - 2.5 + 0.07) \times 10 + T_c$$
$$= 39 + T_c \ (°C)$$

Note 4: Package temperature of device

- Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_c$$
$$= (12.5 \times 2.3 - 14 + 2.5) \times 2 + T_c$$
$$= 35 + T_c \ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally T_a = 60°C) and at the output power of 14W below 90°C.

The thermal resistance $R_{th(c-a)}$ (5) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(14/0.4) - 14 + 0.07}$$
$$= 1.42 \ (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

T_{j1} = 129°C, T_{j2} = 125°C at T_a = 60°C, T_c = 90°C.

In the annual average of ambient temperature is 30°C,

T_{j1} = 99°C, T_{j2} = 95°C

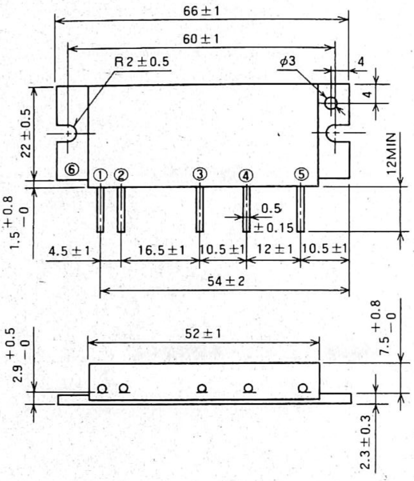
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57714EL

335~360MHz, 12.5V, 7W, FM MOBILE RADIO

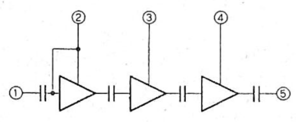
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.2	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	12	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

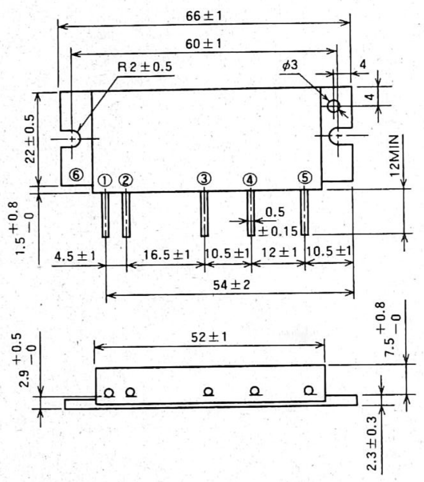
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.1W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	335	360	MHz
P_o	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_o = 7W (P_{in} : controlled) Load VSWR=20:1 (All phase), 2sec. Z_G = 50 Ω	No degradation		−

MITSUBISHI ELECTRIC

M57714SL

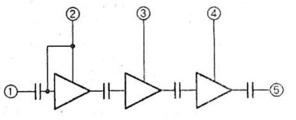
360~380MHz, 12.5V, 7W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.2	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	12	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

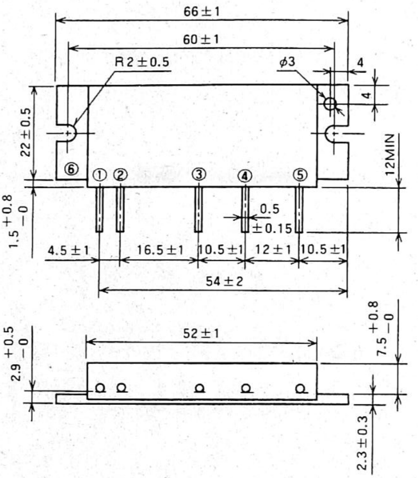
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.1W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	360	380	MHz
P_o	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_o = 7W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M57714UL

380~400MHz, 12.5V, 7W, FM MOBILE RADIO

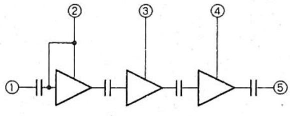
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.2	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	12	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.1W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	380	400	MHz
P_O	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 7W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

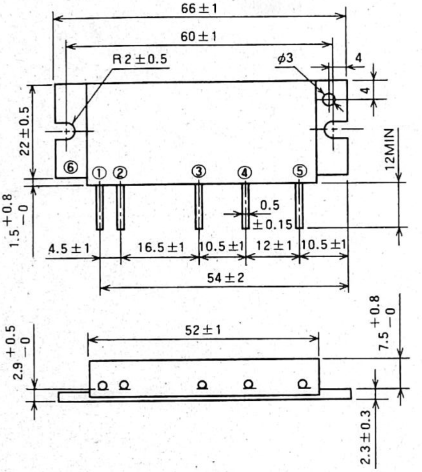
MITSUBISHI ELECTRIC

M57714L

400~420MHz, 12.5V, 7W, FM MOBILE RADIO

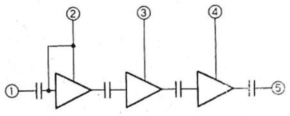
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VCC2 : 2nd. DC SUPPLY
④ VCC3 : 3rd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.2	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	12	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.1W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	400	420	MHz
P_O	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_O = 7W (P_{in} : controlled) Load VSWR=20:1 (All phase), 2sec. Z_G = 50 Ω	No degradation		−

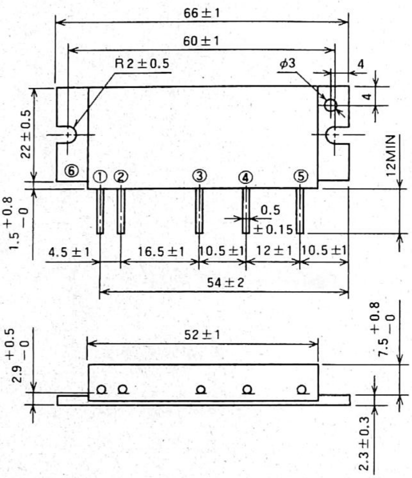
MITSUBISHI ELECTRIC

M57714M

430~450MHz, 12.5V, 7W, FM MOBILE RADIO

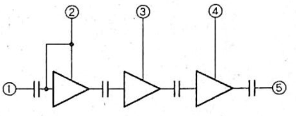
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.2	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	12	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

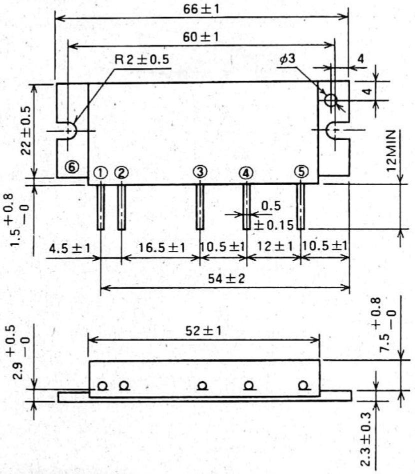
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.1W Vcc = 12.5V $Z_G = Z_L = 50\ \Omega$	430	450	MHz
Po	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

MITSUBISHI ELECTRIC

M57714

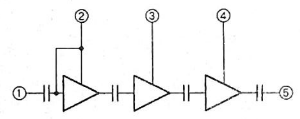
450~470MHz, 12.5V, 7W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

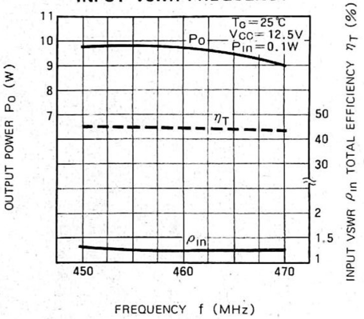
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	0.2	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	12	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

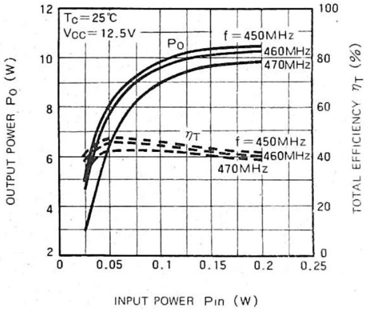
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.1W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\,\Omega$	450	470	MHz
P_O	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_O = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\,\Omega$	No degradation		−

TYPICAL PERFORMANCE DATA

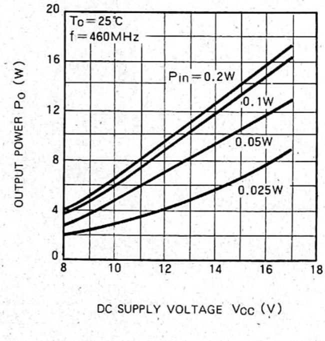
OUTPUT POWER TOTAL EFFICIENCY INPUT VSWR FREQUENCY



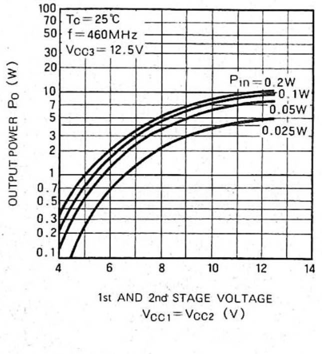
OUTPUT POWER TOTAL EFFICIENCY VS. INPUT POWER



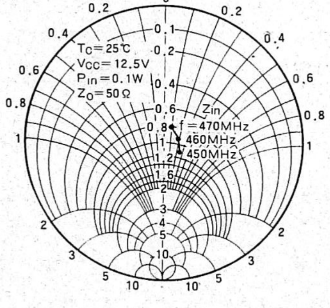
OUTPUT POWER VS. DC SUPPLY VOLTAGE



OUTPUT POWER 1st AND 2nd STAGE VOLTAGE



INPUT IMPEDANCE VS. FREQUENCY



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat shink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 20°C/W$ (Type)

b) Second stage transistor

$R_{th(j-c)2} = 10°C/W$ (Type)

c) Final stage transistor

$R_{th(j-c)3} = 5°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

$P_O = 7W$, $V_{CC} = 12.5V$, $P_{in} = 0.1W$, $\eta_T = 38\%$ (minimum rating), P_{O1} (Note 1) $= 0.8W$, P_{O2} (2) $= 3.2W$, $I_T = 1.47A$ (I_{T1} (3) $= 0.12A$, I_{T2} (4) $= 0.42A$, I_{T3} (5) $= 0.93A$)

Note 1: Output power of the first stage transistor

Note 2: Output power of the second stage transistor

Note 3: Circuit current of the first stage transistor

Note 4: Circuit current of the second stage transistor

Note 5: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C{}^{(6)}$$
$$= (12.5 \times 0.12 - 0.8 + 0.1) \times 20 + T_C$$
$$= 16 + T_C \ (°C)$$

Note 6: Package temperature of device

Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$$
$$= (12.5 \times 0.42 - 3.2 + 0.8) \times 10 + T_C$$
$$= 29 + T_C \ (°C)$$

Junction temperature of the final stage transistor

$$T_{j3} = (V_{CC} \times I_{T3} - P_O + P_{O2}) R_{th(j-c)3} + T_C$$
$$= (12.5 \times 0.93 - 7 + 3.2) \times 5 + T_C$$
$$= 39 + T_C \ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the output power of 7W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.38) - 7 + 0.1}$$
$$= 2.6 \ (°C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 106°C$, $T_{j2} = 119°C$, $T_{j3} = 129°C$ at $T_a = 60°C$, $T_C = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 76°C$, $T_{j2} = 89°C$, $T_{j3} = 99°C$.

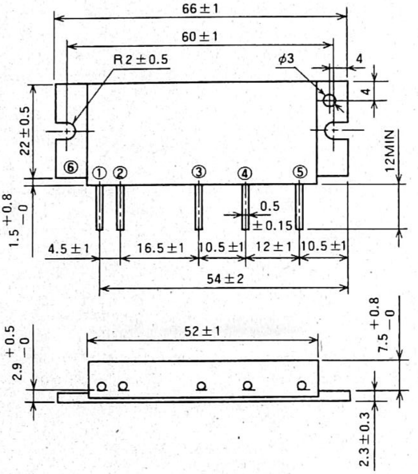
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57714UH

470~490MHz, 12.5V, 7W, FM MOBILE RADIO

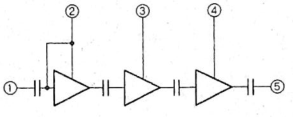
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		4	A
Pin(max)	Input power	ZG = ZL = 50 Ω	0.2	W
Po(max)	Output power	ZG = ZL = 50 Ω	12	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	Pin = 0.1W Vcc = 12.5 VZG = ZL = 50 Ω	470	490	MHz
Po	Output power		7		W
ηT	Total efficiency		38		%
2fo	2nd. harmonic			−30	dB
ρin	Input VSWR			2	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 7W (Pin : controlled) Load VSWR=20:1(All phase), 2sec. ZG = 50 Ω	No degradation		−

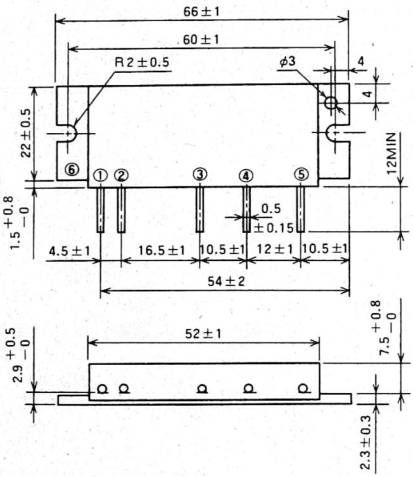
MITSUBISHI ELECTRIC

M57714SH

490~512MHz, 12.5V, 7W, FM MOBILE RADIO

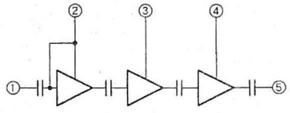
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		4	A
Pin(max)	Input power	ZG = ZL = 50 Ω	0.2	W
Po(max)	Output power	ZG = ZL = 50 Ω	12	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

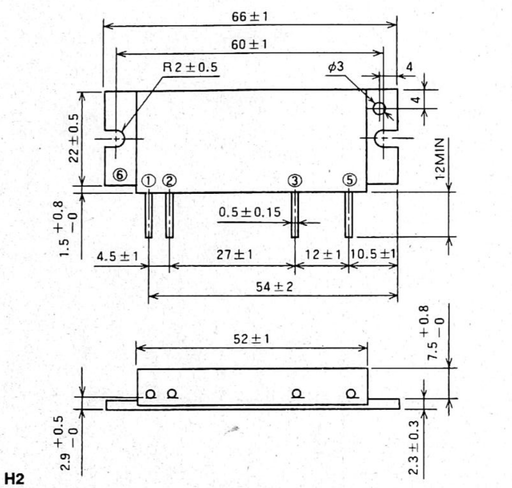
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	Pin = 0.1W Vcc = 12.5V ZG = ZL = 50 Ω	490	512	MHz
Po	Output power		7		W
ηT	Total efficiency		38		%
2fo	2nd. harmonic			−30	dB
ρin	Input VSWR			2	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 7W (Pin : controlled) Load VSWR=20:1(All phase), 2sec. ZG = 50 Ω	No degradation		−

MITSUBISHI ELECTRIC

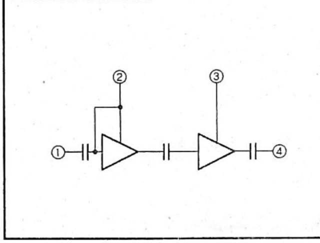
M57715

144~148MHz, 12.5V, 13W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VCC2 : 2nd. DC SUPPLY
④ Po : RF OUTPUT
⑤ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		5	A
Pin(max)	Input power	ZG = ZL = 50 Ω	0.4	W
Po(max)	Output power	ZG = ZL = 50 Ω	20	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

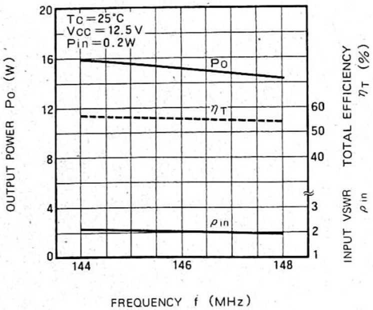
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	Pin = 0.2W, Vcc = 12.5V, ZG = ZL = 50 Ω	144	148	MHz
Po	Output power		13		W
η_T	Total efficiency		48		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 14W (Pin : controlled) Load VSWR=20:1(All phase), 2sec. ZG = 50Ω	No degradation		−

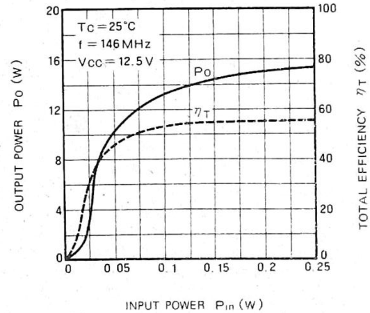
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

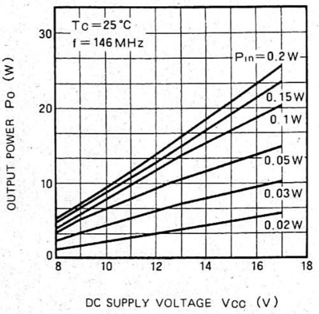
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



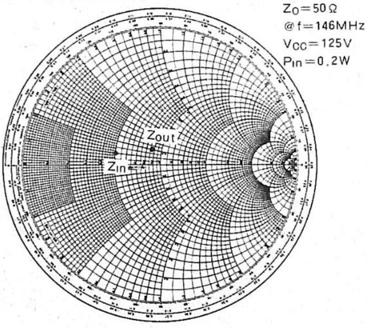
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER



OUTPUT POWER VS. DC SUPPLY VOLTAGE



INPUT IMPEDANCE, OUTPUT IMPEDANCE



DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 10°C/W$ (Typ.)

b) Final stage transistor

$R_{th(j-c)2} = 3°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

  $P_o = 13W$, $V_{CC} = 12.5V$, $P_{in} = 0.2W$, $\eta_T = 48\%$ (minimum rating), P_{O1} (Note 1) $= 2.5W$, $I_T = 2.2A$ (I_{T1} (2) $= 0.45A$, I_{T2} (3) $= 1.75A$)

  Note 1: Output power of the first stage transistor

  Note 2: Circuit current of the first stage transistor

  Note 3: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

  $$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_c^{(4)}$$
  $$= (12.5 \times 0.45 - 2.5 + 0.2) \times 10 + T_c$$
  $$= 33 + T_c \ (°C)$$

  Note 4: Package temperature of device

- Junction temperature of the final stage transistor

  $$T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{O1}) \times R_{th(j-c)2} + T_c$$
  $$= (12.5 \times 1.15 - 13 + 2.5) \times 3 + T_c$$
  $$= 34 + T_c \ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the output power of 8W below 90°C.

The thermal resistance $R_{th(c-a)}$ (5) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(13/0.48) - 13 + 0.2}$$
$$= 2.8 \ (°C)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 113°C$, $T_{j2} = 134°C$ at $T_a = 60°C$, $T_c = 90°C$.

In the annual average of ambient temperature is 33°C,

$T_{j1} = 103°C$, $T_{j2} = 104°C$

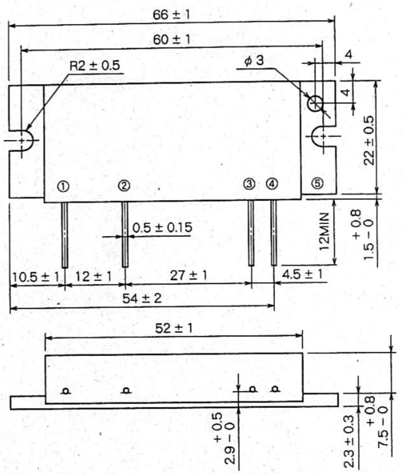
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensure.

M57715R

144~148MHz, 12.5V, 13W, FM MOBILE RADIO

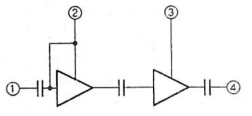
OUTLINE DRAWING

Dimensions in mm



H2R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

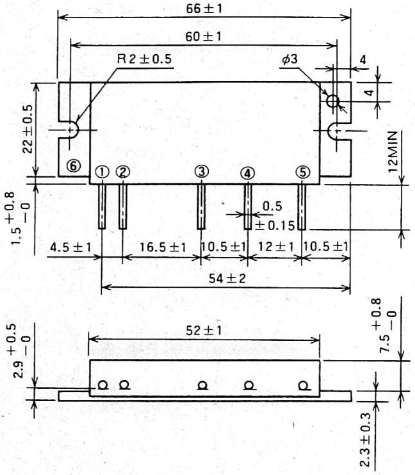
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.2W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	144	148	MHz
P_O	Output power		13		W
η_T	Total efficiency		48		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_O = 14W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

M57716

430~450MHz, 12.5V, 17W, SSB MOBILE RADIO

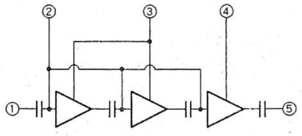
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VBB : BASE BIAS
③VCC1 : 1st. DC SUPPLY
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
V_{BB}			10	V
I_{CC}	Total current		6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.3	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	28	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

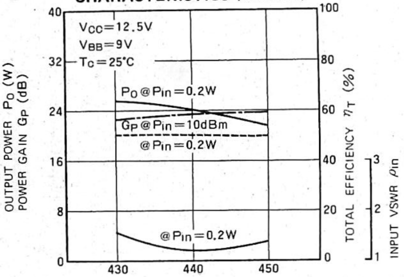
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $V_{BB} = 9V$ $Z_G = Z_L = 50\ \Omega$	430	450	MHz
Po	Output power		17		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $V_{BB} = 9V$ $P_o = 14W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

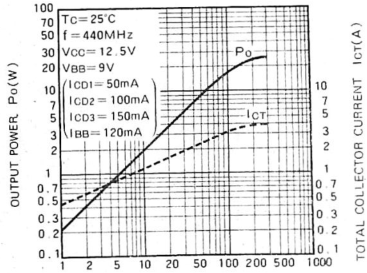
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

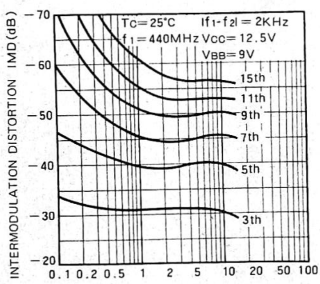
OUTPUT POWER, POWER GAIN, TOTAL EFFICIENCY, INPUT VSWR-FREQUENCY CHARACTERISTICS (M57716)



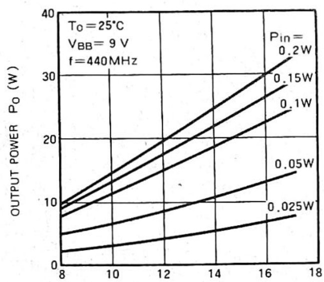
OUTPUT POWER, TOTAL COLLECTOR CURRENT VS. INPUT POWER



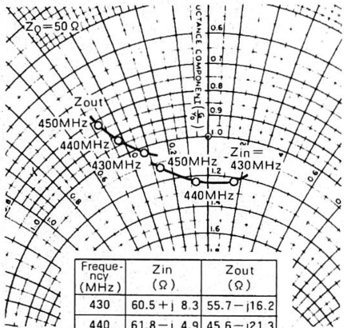
INTERMODULATION DISTORTION VS. OUTPUT POWER



OUTPUT POWER VS. DC SUPPLY VOLTAGE



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY



Frequency (MHz)	Zin (Ω)	Zout (Ω)
430	60.5 + j 8.3	55.7 − j16.2
440	61.8 − j 4.9	45.6 − j21.3
450	58.3 − j14.8	41.3 − j23.4

Test condition : V_{CC}=12.5V, V_{BB}=9V
P_{in}=0.2W

DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat shink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1}$ = 15°C/W (Typ.)

b) Second stage transistor

$R_{th(j-c)2}$ = 6°C/W (Typ.)

c) Final stage transistor

$R_{th(j-c)3}$ = 2°C/W (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

P_o = 14W, V_{CC} = 12.5V, P_{in} = 80mW, η_T = 35% (minimum rating), P_{o1} (Note 1) = 1W, P_{o2} (2) = 4.5W, I_T = 3.2A (I_{T1} (3) = 0.15A, I_{T2} (4) = 0.55A, I_{T3} (5) = 2.5A)

Note 1: Output power of the first stage transistor
Note 2: Output power of the second stage transistor
Note 3: Circuit current of the first stage transistor
Note 4: Circuit current of the second stage transistor
Note 5: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c$ (6)
$= (12.5 \times 0.15 - 1 + 0.08) \times 15 + T_c$
$= 14.4 + T_c$ (°C)

Note 6: Package temperature of device

- Junction temperature of the second stage transistor

$T_{j2} = (V_{CC} \times I_{T2} - P_{o2} + P_{o1}1) \times R_{th(j-c)2} + T_c$
$= (12.5 \times 0.55 - 4.5 + 1) \times 6 + T_c$
$= 20.3 + T_c$ (°C)

- Junction temperature of the final stage transistor

$T_{j3} = (V_{CC} \times I_{T3} - P_o + P_{o2}) \times R_{th(j-c)3} + T_c$
$= (12.5 \times 2.5 - 14 + 4.5) \times 2 + T_c$
$= 43.5 + T_c$ (°C

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally T_a = 60°C) and at the output power of 14W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

Note 7:
$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(14/0.35) - 14 + 0.08}$$
$= 1.15$ (°C/W)

Note 7: Inclusive of the contact thermal resistance between device and heat sink.

Mounting the heat sink of the above thermal resistance on the device,

T_{j1} = 104.4°C, T_{j2} = 110.3°C, T_{j3} = 133.5°C at T_a = 60°C, T_c = 90°C.

In the annual average of ambient temperature is 30°C,

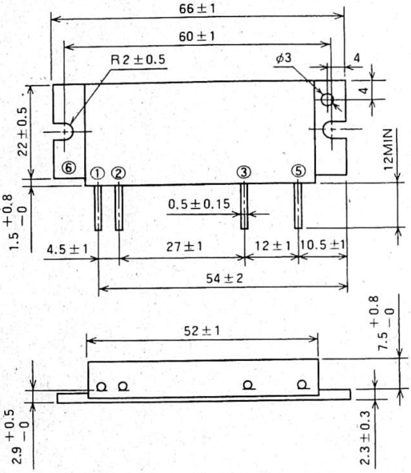
T_{j1} = 74.4°C, T_{j2} = 80.3°C, T_{j3} = 103.5°C.

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57719L

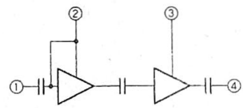
135~145MHz, 12.5V, 14W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.2W Vcc = 12.5V $Z_G = Z_L = 50\ \Omega$	135	145	MHz
Po	Output power		14		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			4	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 14W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

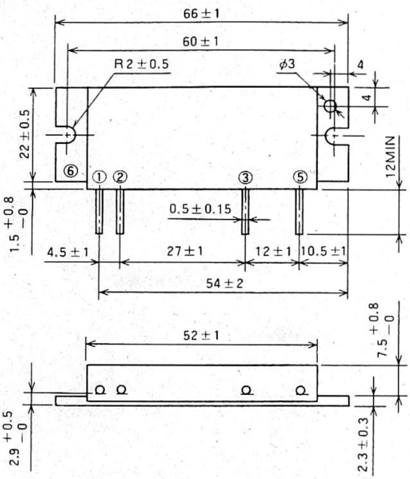
MITSUBISHI ELECTRIC

M57719N

142~163MHz, 12.5V, 14W, FM MOBILE RADIO

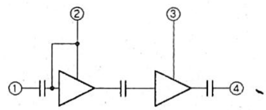
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :

①Pin : RF INPUT

②Vcc1 : 1st. DC SUPPLY

③Vcc2 : 2nd. DC SUPPLY

④Po : RF OUTPUT

⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

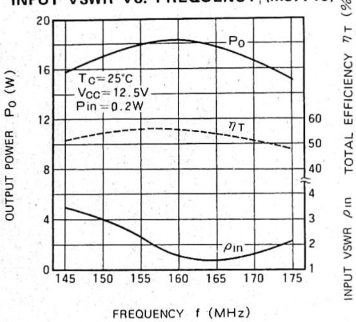
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	142	163	MHz
Po	Output power		14		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			4	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_o = 14W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		−

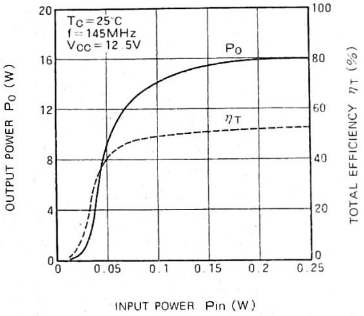
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

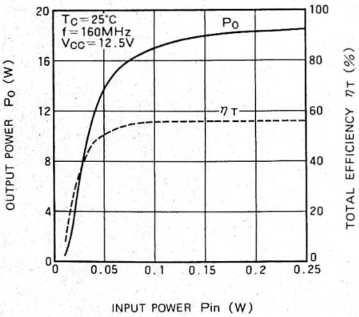
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY (M57719)



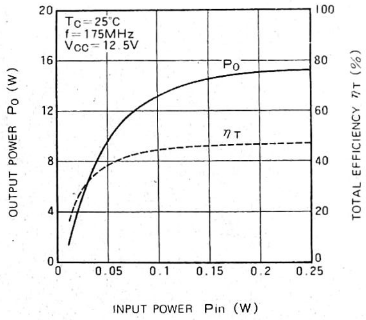
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719)



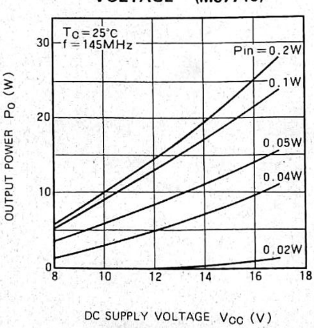
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719)



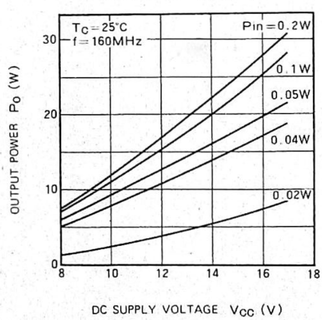
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719)



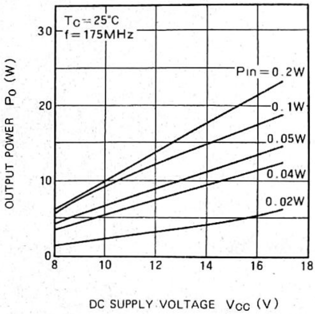
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719)



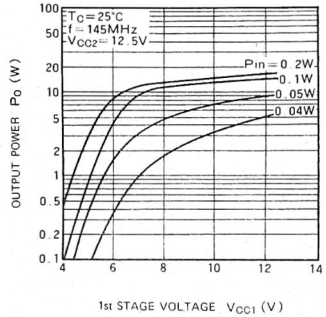
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719)



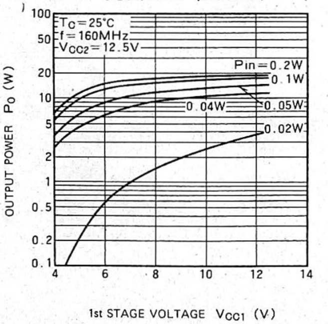
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719)



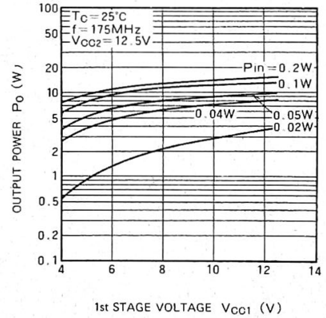
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719)



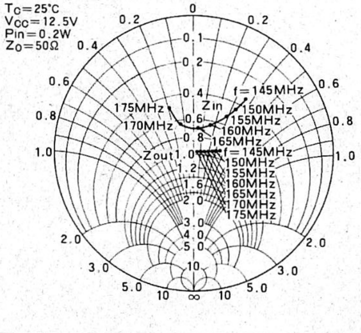
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719)



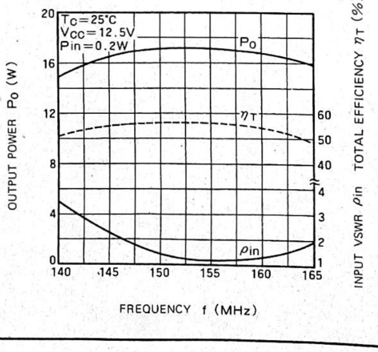
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719)



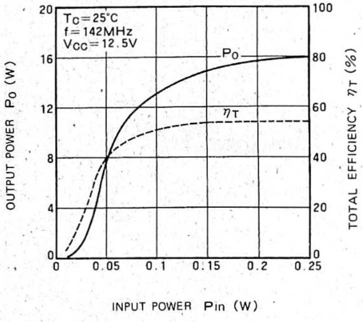
OUTPUT IMPEDANCE, INPUT IMPEDANCE VS. FREQUENCY (M57719)



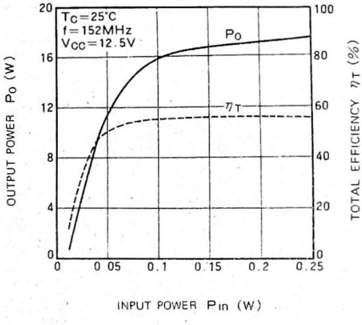
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY (M57719N)



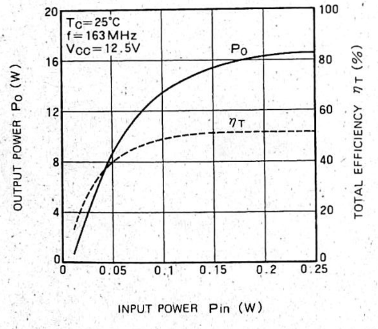
OUTPUT POWER, TOTAL EFFICIENCY VS. INPUT POWER (M57719N)



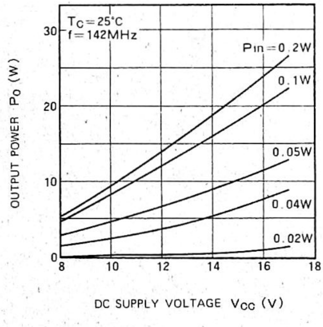
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719N)



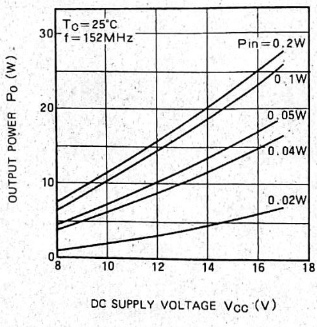
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719N)



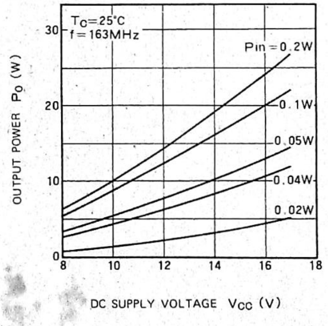
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719N)



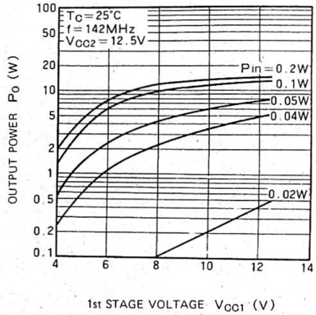
OUTPUT POWER VS. SUPPLY VOLTAGE (M57719N)



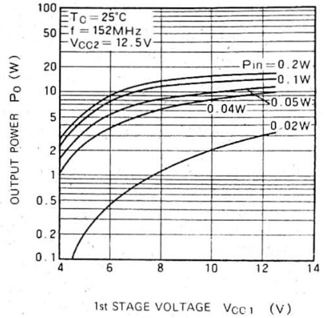
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719N)



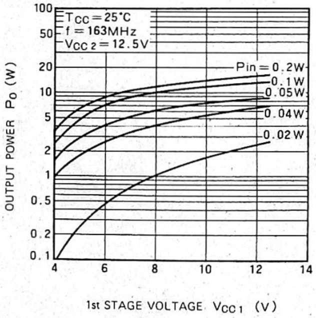
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719N)



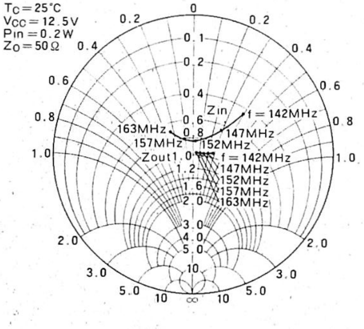
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719N)



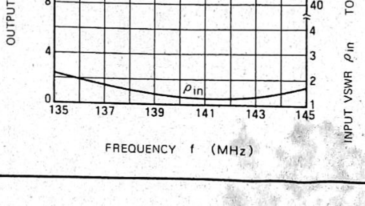
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719N)



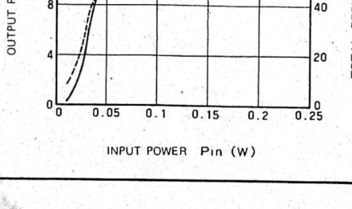
OUTPUT IMPEDANCE, INPUT IMPEDANCE VS. FREQUENCY (M57719N)



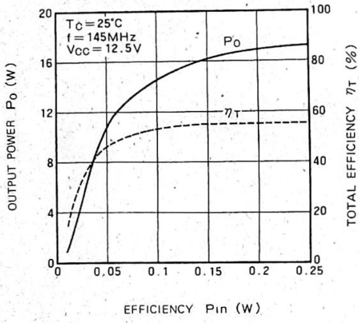
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY (M57719L)



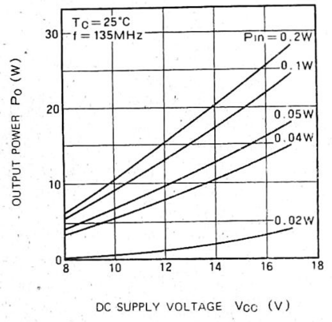
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719L)



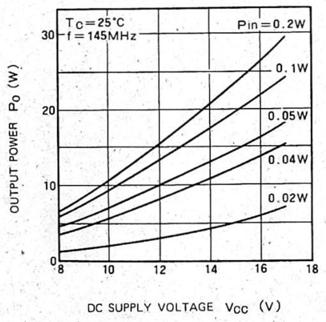
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57719L)



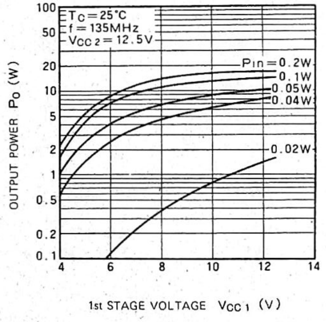
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719L)



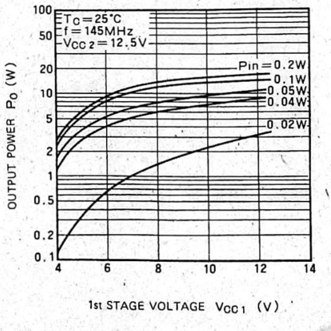
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57719L)



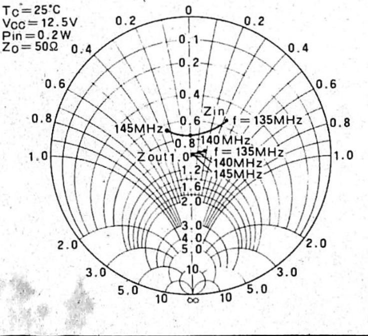
OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719L)



OUTPUT POWER VS. 1st STAGE VOLTAGE (M57719L)



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY (M57719L)



DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 10°C/W$ (Typ.)

b) Final stage transistor

$R_{th(j-c)2} = 3°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

$P_o = 14W$, $V_{CC} = 12.5V$, $P_{in} = 0.2W$, $\eta_T = 40\%$ (minimum rating), P_{o1} (Note 1) $= 2.5W$, $I_T = 2.8A$ (I_{T1} (2) $= 0.5A$, I_{T2} (3) $= 2.3A$)

Note 1: Output power of the first stage transistor
Note 2: Circuit current of the first stage transistor
Note 3: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c{}^{(4)}$$
$$= (12.5 \times 0.5 - 2.5 + 0.2) \times 10 + T_c$$
$$= 39.5 + T_c\ (°C)$$

Note 4: Package temperature of device

- Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_c$$
$$= (12.5 \times 2.3 - 14 + 2.5) \times 3 + T_c$$
$$= 51.8 + T_c\ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60°C$) and at the output power of 14W below 90°C.

The thermal resistance $R_{th(c-a)}$ (5) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(14/0.40) - 14 + 0.2}$$
$$= 1.9\ (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 140°C$, $T_{j2} = 152°C$ at $T_a = 60°C$, $T_c = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 110°C$, $T_{j2} = 122°C$

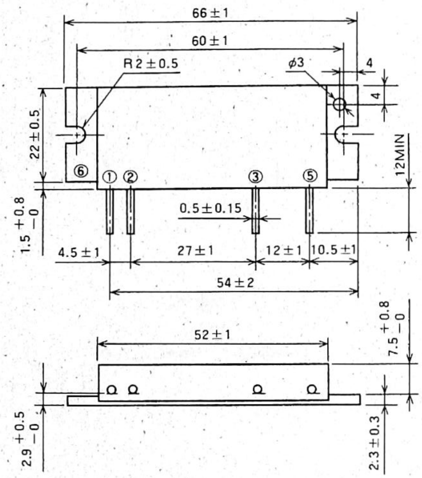
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57719

145~175MHz, 12.5V, 14W, FM MOBILE RADIO

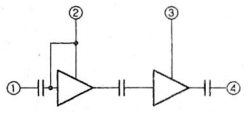
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	145	175	MHz
P_O	Output power		14		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			4	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 14W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		−

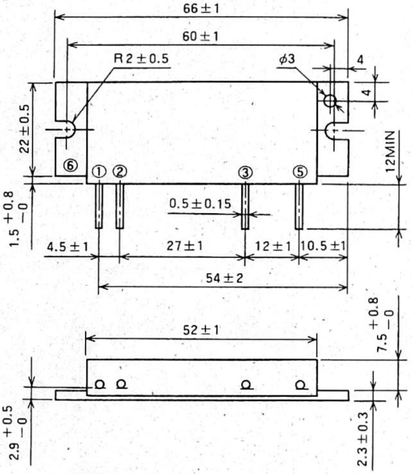
MITSUBISHI ELECTRIC

M57726

144~148MHz, 12.5V, 43W, FM MOBILE RADIO

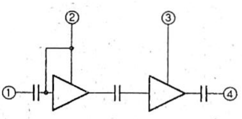
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		14	A
Pin(max)	Input power	ZG = ZL = 50 Ω	0.6	W
Po(max)	Output power	ZG = ZL = 50 Ω	55	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

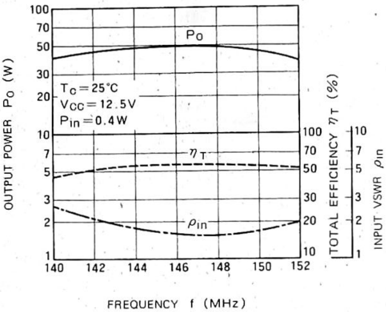
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	Pin = 0.3W, Vcc = 12.5V, ZG = ZL = 50 Ω	144	148	MHz
Po	Output power		43		W
ηT	Total efficiency		50		%
2fo	2nd. harmonic			−35	dB
3fo	3rd. harmonic			−45	dB
ρin	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 45W (Pin : controlled), Load VSWR=20:1 (All phase), 5sec. ZG = 50Ω	No degradation		−

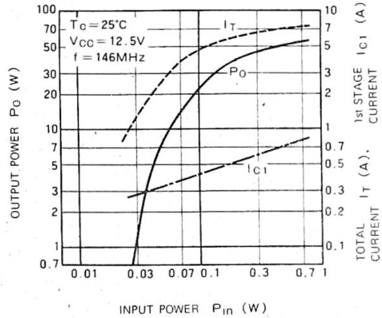
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

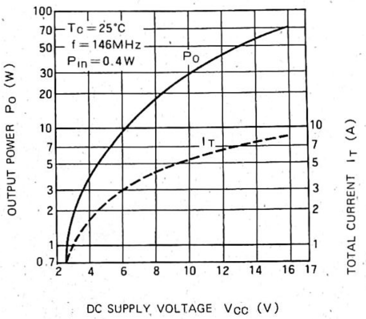
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



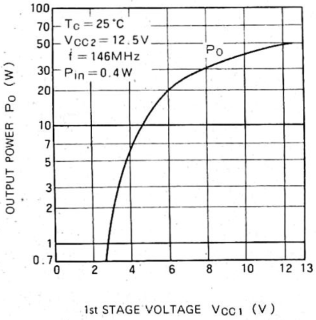
OUTPUT POWER, 1st STAGE CURRENT TOTAL CURRENT VS. INPUT POWER



OUTPUT POWER, TOTAL CURRENT VS. DC SUPPLY VOLTAGE



OUTPUT POWER VS. 1st STAGE VOLTAGE



DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 4.3°C/W$ (Typ.)

b) Final stage transistor

$R_{th(j-c)2} = 1.5°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.
  $P_o = 43W$, $V_{CC} = 12.5V$, $P_{in} = 0.4W$, $\eta_T = 50\%$ (minimum rating), P_{o1} (Note 1) $= 9.4W$, $I_T = 6.88A$ (I_{T1} (2) $=$ 1.25A, I_{T2} (3) $= 5.63A$)
  Note 1: Output power of the first stage transistor
  Note 2: Circuit current of the first stage transistor
  Note 3: Circuit current of the final stage transistor
- Junction temperature of the first stage transistor
  $T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c$ (4)
  $= (12.5 \times 1.25 - 9.4 + 0.4) \times 4.3 + T_c$
  $= 28.5 + T_c$ (°C)
  Note 4: Package temperature of device
- Junction temperature of the final stage transistor
  $T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}1) \times R_{th(j-c)2} + T_c$
  $= (12.5 \times 5.63 - 63 + 9.4) \times 1.5 + T_c$
  $= 55.2 + T_c$ (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60°C$) and at the output power of 43W below 90°C.

The thermal resistance $R_{th(c-a)}$ (5) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(43/0.5) - 43 + 0.4}$$

$$= 0.69\ (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 118.5°C$, $T_{j2} = 145.2°C$ at $T_a = 60°C$, $T_c = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 88.5°C$, $T_{j2} = 115.2°C$

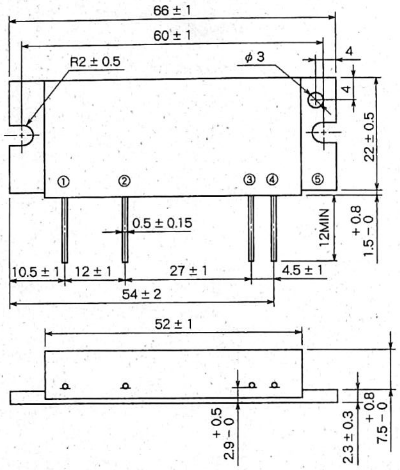
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57726R

144~148MHz, 12.5V, 43W, FM MOBILE RADIO

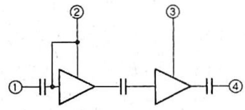
OUTLINE DRAWING

Dimensions in mm



H2R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		14	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	55	W
$T_{C(OP)}$	Operation case temperature		− 30~110	℃
T_{stg}	Storage temperature		− 40~110	℃

ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

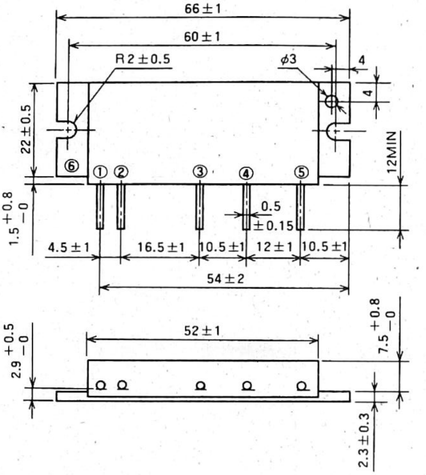
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	144	148	MHz
P_o	Output power		43		W
η_T	Total efficiency		50		%
2fo	2nd. harmonic			− 35	dB
3fo	3rd. harmonic			− 45	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_o = 45W (P_{in} : controlled) Load VSWR=20:1(All phase), 5sec. Z_G = 50Ω	No degradation		−

MITSUBISHI ELECTRIC

M57727

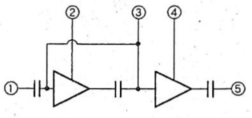
144~148MHz, 12.5V, 37W, SSB MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

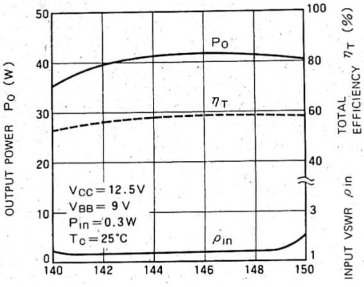
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
V_{BB}	Base bias		10	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

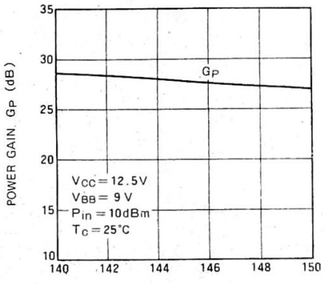
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V V_{BB} = 9V $Z_G = Z_L = 50\ \Omega$	144	148	MHz
Po	Output power		37		W
η_T	Total efficiency		50		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.2	−
−	Load VSWR tolerance	V_{CC} = 15.2V, V_{BB} = 9V Po = 30W (P_{in} : controlled) Load VSWR≧20:1(All phase), 5sec. Z_G = 50 Ω	No degradation		−

TYPICAL PERFORMANCE DATA

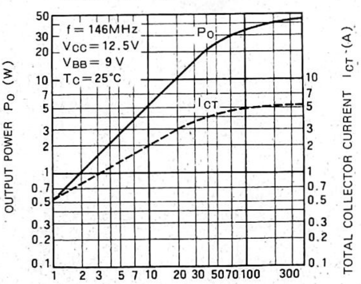
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



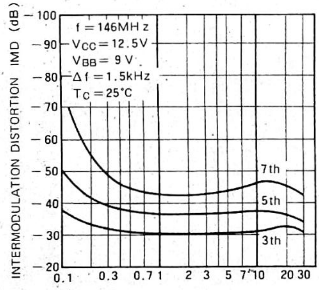
POWER GAIN VS. FREQUENCY



OUTPUT POWER, TOTAL COLLECTOR CURRENT VS. INPUT POWER



INTERMODULATION DISTORTION VS. OUTPUT POWER



DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 3°C/W$ (Typ.)

b) Final stage transistor

$R_{th(j-c)2} = 1.5°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

$P_O = 30W$, $V_{CC} = 12.5V$, $P_{in} = 0.1W$, $\eta_T = 50\%$ (minimum rating), P_{O1} (Note 1) $= 2W$, $I_T = 4.8A$ (I_{T1} (2) $= 0.4A$, I_{T2} (3) $= 4.4A$)

Note 1: Output power of the first stage transistor
Note 2: Circuit current of the first stage transistor
Note 3: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)2} + T_C^{(4)}$$
$$= (12.5 \times 0.4 - 2 + 0.1) \times 3 + T_C$$
$$= 9.3 + T_C \ (°C)$$

Note 4: Package temperature of device

- Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_O + P_{O1}) \times R_{th(j-c)2} + T_C$$
$$= (12.5 \times 4.4 - 30 + 2) \times 1.5 + T_C$$
$$= 40.5 + T_C \ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60°C$) and at the output power of 30W below 90°C.

The thermal resistance $R_{th(c-a)}$ (5) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(30/0.5) - 30 + 0.1}$$
$$= 1.00 \ (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 110°C$, $T_{j2} = 131°C$ at $T_a = 60°C$, $T_C = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 70°C$, $T_{j2} = 101°C$

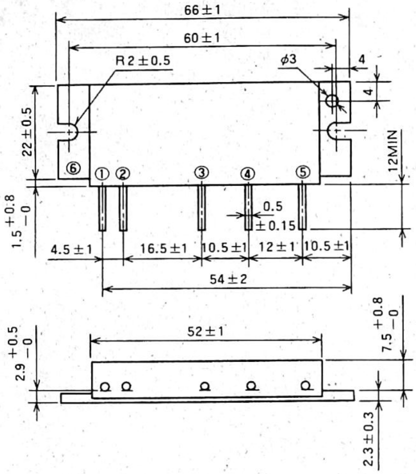
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57729EL

335~360MHz, 12.5V, 30W, FM MOBILE RADIO

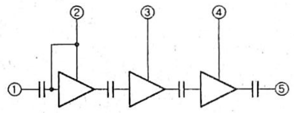
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 0.3W$, $V_{CC} = 12.5V$, $Z_G = Z_L = 50\ \Omega$	335	360	MHz
P_O	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 30W$ (P_{in} : controlled) Load VSWR=20:1 (All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

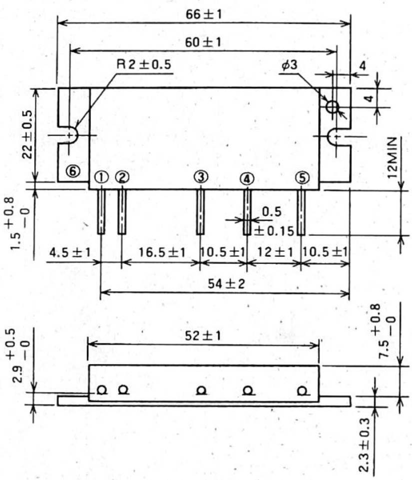
MITSUBISHI ELECTRIC

M57729SL

360~380MHz, 12.5V, 30W, FM MOBILE RADIO

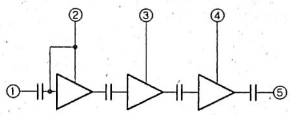
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.3W, V_{CC} = 12.5V, $Z_G = Z_L = 50\,\Omega$	360	380	MHz
P_O	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_O = 30W (P_{in} : controlled), Load VSWR=20:1(All phase), 2sec. $Z_G = 50\,\Omega$	No degradation		−

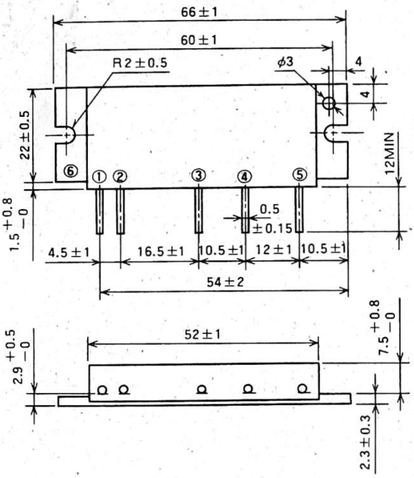
MITSUBISHI ELECTRIC

M57729UL

380~400MHz, 12.5V, 30W, FM MOBILE RADIO

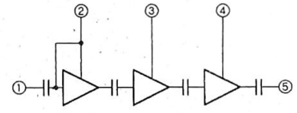
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\,\Omega$	380	400	MHz
Po	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, Po = 30W (P_{in} : controlled) Load VSWR=20:1 (All phase), 2sec. Z_G = 50 Ω	No degradation		−

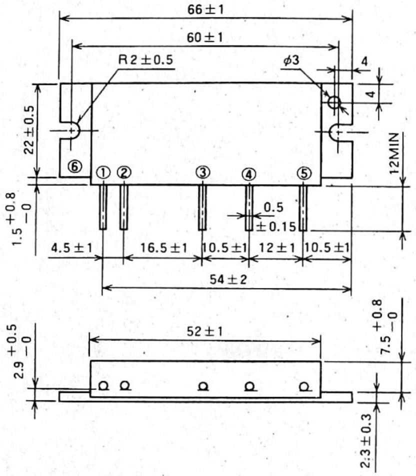
MITSUBISHI ELECTRIC

M57729L

400~420MHz, 12.5V, 30W, FM MOBILE RADIO

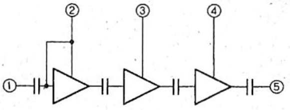
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

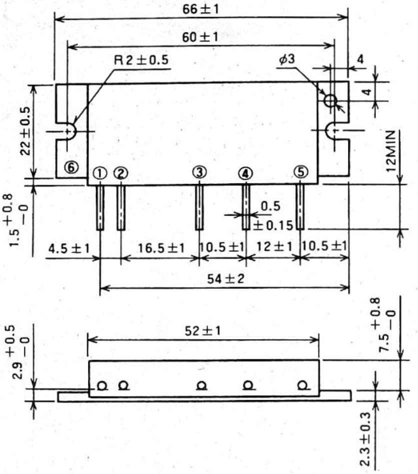
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 0.3W$, $V_{CC} = 12.5V$, $Z_G = Z_L = 50\ \Omega$	400	420	MHz
P_O	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 30W$ (P_{in} : controlled), Load VSWR=20:1 (All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M57729

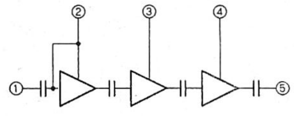
430~450MHz, 12.5V, 30W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

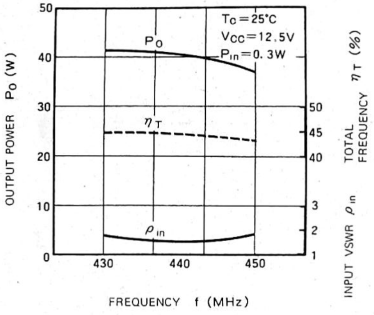
ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

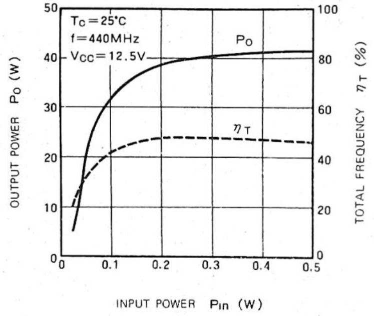
ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	430	450	MHz
P_o	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_o = 30W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

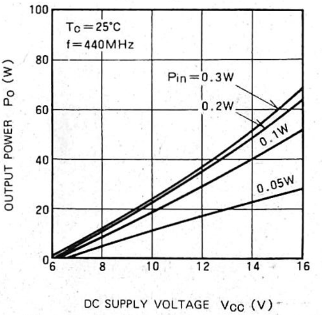
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY (M57729)



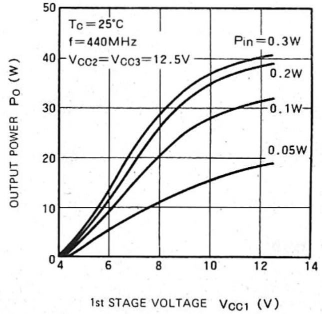
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57729)



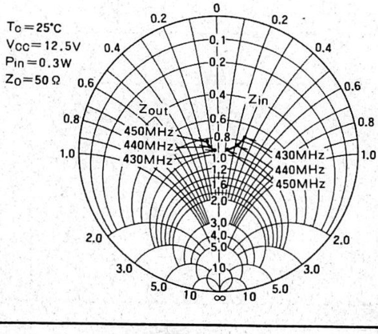
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57729)



OUTPUT POWER VS. 1st STAGE VOLTAGE (M57729)



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY (M57729)



MITSUBISHI ELECTRIC

DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 12°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 4\ °C/W$ (Typ.)

c) Final stage transistor

$R_{th(j-c)3} = 2°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at stadard operation.

- Conditions for standard operation.

P_o = 30W, V_{CC} = 12.5V, P_{in} = 0.3W, η_T = 40% (minimum rating), P_{o1} (Note 1) = 2.0W, P_{o2} (2) = 8.0W, I_T = 6.0A (I_{T1} (3) = 0.35A, I_{T2} (4) = 1.32A, I_{T3} (5) = 4.33A)

Note 1: Output power of the first stage transistor
Note 2: Output power of the second stage transistor
Note 3: Circuit current of the first stage transistor
Note 4: Circuit current of the second stage transistor
Note 5: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_C{}^{(6)}$$
$$= (12.5 \times 0.35 - 2.0 + 0.3) \times 12 + T_c$$
$$= 32 + T_c\ (°C)$$

Note 6: Package temperature of device

- Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_{o2} + P_{o1}) \times R_{th(j-c)2} + T_c$$
$$= (12.5 \times 1.32 - 8.0 + 2.0) \times 4 + T_c$$
$$= 42 + T_c\ (°C)$$

- Junction temperature of the final stage transistor

$$T_{j3} = (V_{CC} \times I_{T3} - P_o + P_{o2}) \times R_{th(j-c)3} + T_c$$
$$= (12.5 \times 4.33 - 30 + 8) \times 2 + T_c$$
$$= 64 + T_c\ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally T_a = 60°C) and at the output power of 7W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(30/0.4) - 30 + 0.3}$$
$$= 0.66\ (°C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

T_{j1} = 122°C, T_{j2} = 132°C, T_{j3} = 155°C at T_a = 60°C, T_c = 90°C.

In the annual average of ambient temperature is 30°C,

T_{j1} = 92°C, T_{j2} = 102°C, T_{j3} = 125°C.

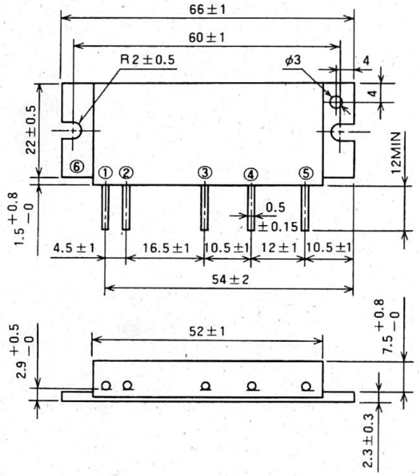
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57729H

450~470MHz, 12.5V, 30W, FM MOBILE RADIO

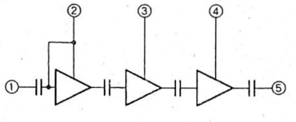
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② V_{CC1} : 1st. DC SUPPLY
③ V_{CC2} : 2nd. DC SUPPLY
④ V_{CC3} : 3rd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

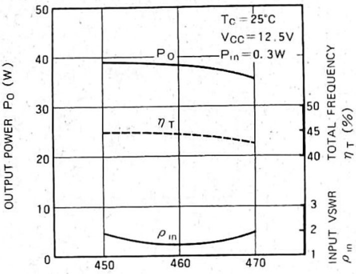
ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	450	470	MHz
Po	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, Po = 30W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

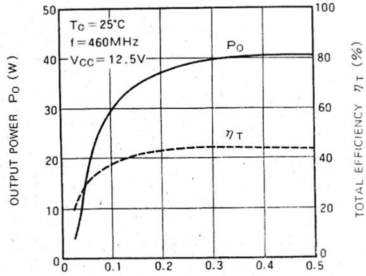
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

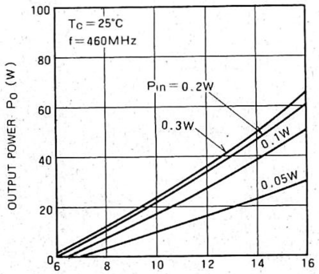
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY (M57729H)



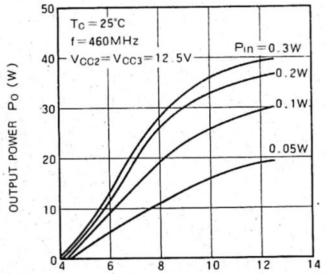
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER (M57729H)



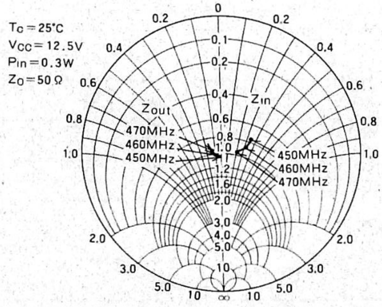
OUTPUT POWER VS. DC SUPPLY VOLTAGE (M57729H)



OUTPUT POWER VS. 1st STAGE VOLTAGE (M57729H)



OUTPUT IMPEDANCE, INPUT IMPEDANCE VS. FREQUENCY (M57729H)

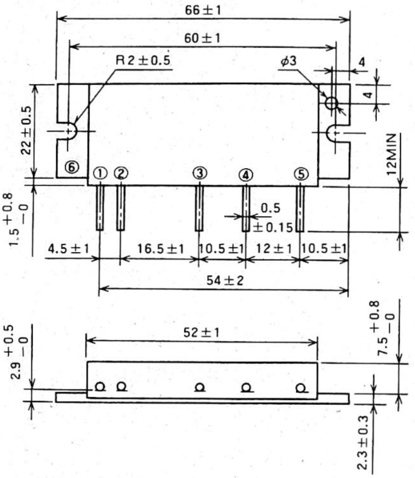


M57729UH

470~490MHz, 12.5V, 30W, FM MOBILE RADIO

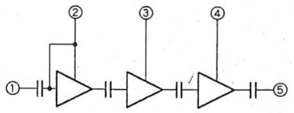
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	470	490	MHz
P_o	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_o = 30W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

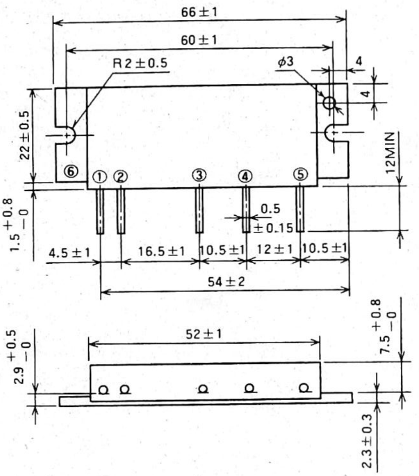
MITSUBISHI ELECTRIC

M57729SH

490~512MHz, 12.5V, 30W, FM MOBILE RADIO

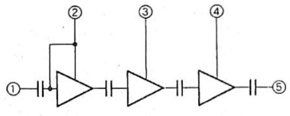
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

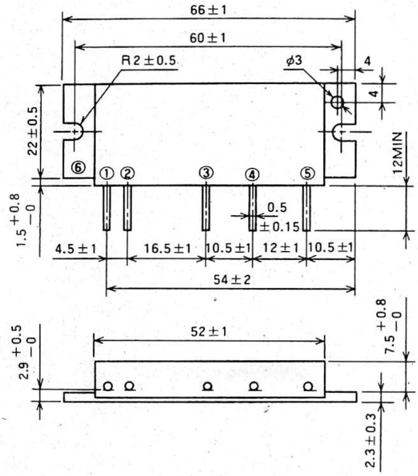
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 0.3W$, $V_{CC} = 12.5V$, $Z_G = Z_L = 50\ \Omega$	490	512	MHz
P_O	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 30W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M57734

453~457.5MHz, 12.5V, 30W, FM MOBILE RADIO

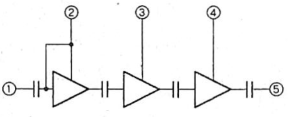
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		8	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	35	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

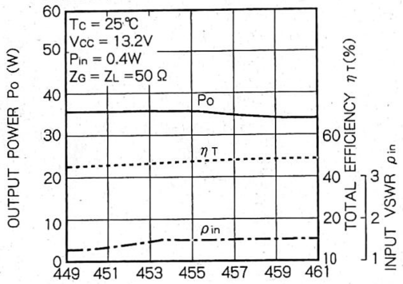
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.4W, V_{CC} = 13.2V, $Z_G = Z_L = 50\ \Omega$	453	457.5	MHz
P_o	Output power		30		W
η_T	Total efficiency		35		%
$2f_o$	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_o = 28W (P_{in} : controlled), Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

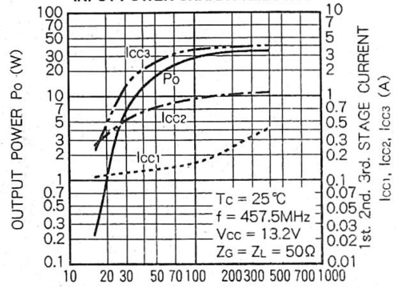
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

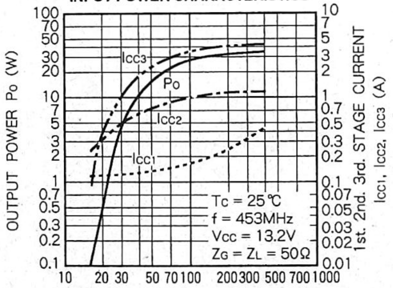
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



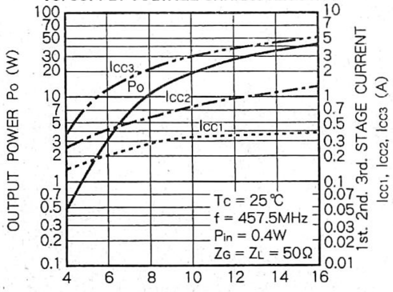
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



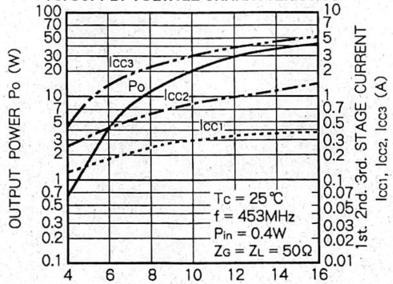
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



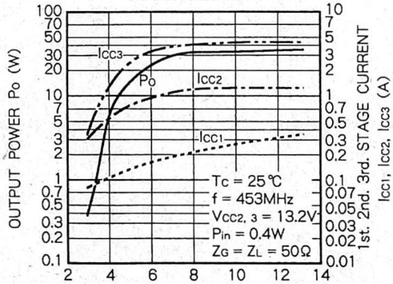
OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



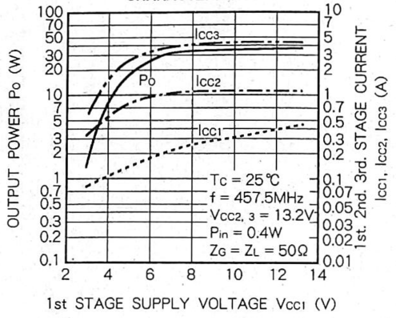
OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

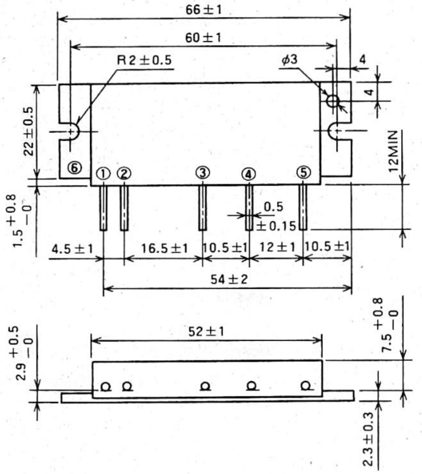


M57735

50~54MHz, 12.5V, 19W, SSB MOBILE RADIO

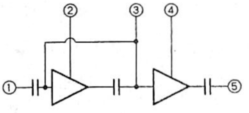
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④Vcc2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
V_{BB}	Base bias		10	V
I_{CC}	Total current		6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	25	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

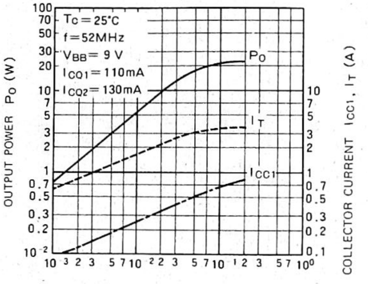
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $V_{BB} = 9V$ $Z_G = Z_L = 50\ \Omega$	50	54	MHz
P_O	Output power		19		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.2	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $V_{BB} = 9V$ $P_O = 14W$ (P_{in} : controlled) Load VSWR≧20:1 (All phase) $Z_G = 50\ \Omega$	No degradation		−

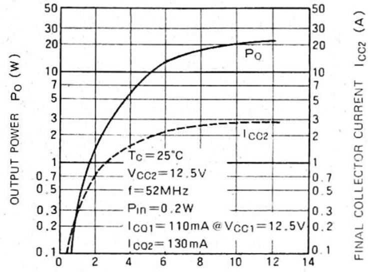
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

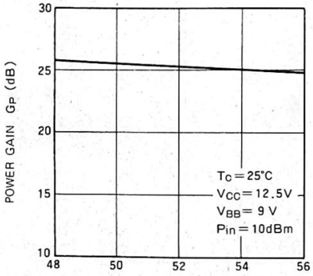
OUTPUT POWER, TOTAL COLLECTOR CURRENT 1st COLLECTOR CURRENT VS. INPUT POWER



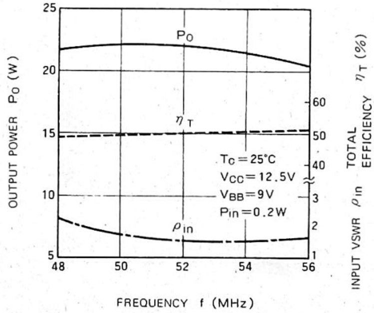
OUTPUT POWER, FINAL COLLECTOR CURRENT VS. 1st STAGE VOLTAGE



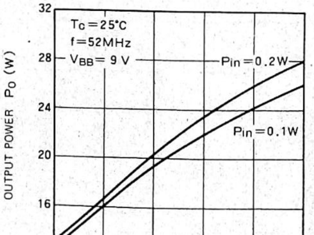
POWER GAIN VS. FREQUENCY



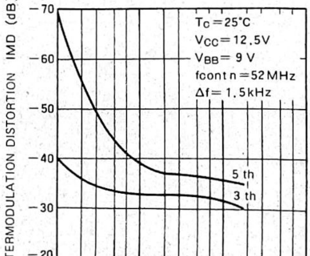
OUTPUT POWER, TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY



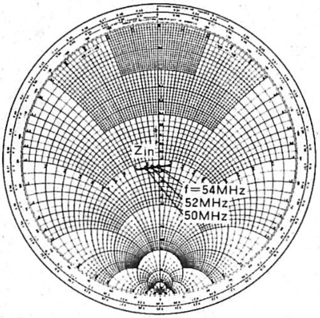
OUTPUT POWER VS. DC SUPPLY VOLTAGE



INTERMODULATION DISTORTION VS. OUTPUT POWER



INPUT IMPEDANCE VS. FREQUENCY



DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 10°C/W$ (Typ.)

b) Final stage transistor

$R_{th(j-c)2} = 2°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

$P_o = 14W$, $V_{CC} = 12.5V$, $P_{in} = 0.07W$, $\eta_T = 40\%$ (minimum rating), P_{o1} (Note 1) $= 2.5W$, $I_T = 2.8A$ (I_{T1} (2) $= 0.5A$, I_{T2} (3) $= 2.3A$)

Note 1: Output power of the first stage transistor
Note 2: Circuit current of the first stage transistor
Note 3: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c{}^{(4)}$$
$$= (12.5 \times 0.5 - 2.5 + 0.07) \times 10 + T_c$$
$$= 39 + T_c\ (°C)$$

Note 4: Package temperature of device

- Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_c$$
$$= (12.5 \times 2.3 - 14 + 2.5) \times 2 + T_c$$
$$= 35 + T_c\ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60°C$) and at the output power of 14W below 90°C.

The thermal resistance $R_{th(c-a)}$ (5) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(14/0.4) - 14 + 0.07}$$
$$= 1.42\ (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 129°C$, $T_{j2} = 125°C$ at $T_a = 60°C$, $T_c = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 99°C$, $T_{j2} = 95°C$

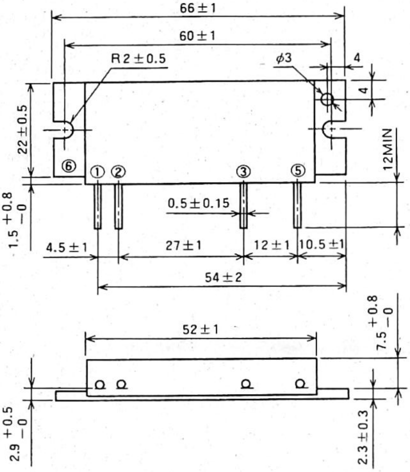
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57737

144~148MHz, 12.5V, 30W, FM MOBILE RADIO

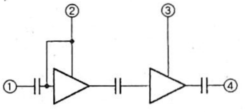
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS ($T_c = 25$℃ unless otherwise noted)

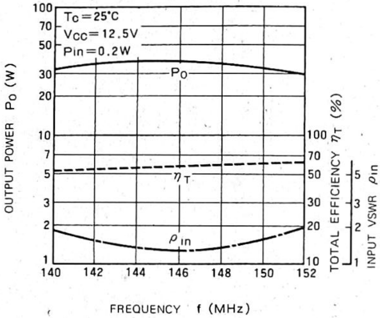
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS ($T_c = 25$℃ unless otherwise noted)

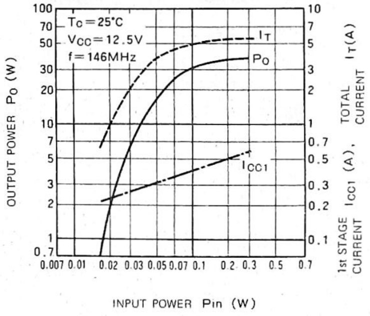
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	144	148	MHz
Po	Output power		30		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 35W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 5sec. $Z_G = 50\Omega$	No degradation		−

TYPICAL PERFORMANCE DATA

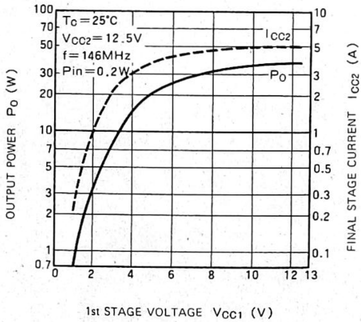
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



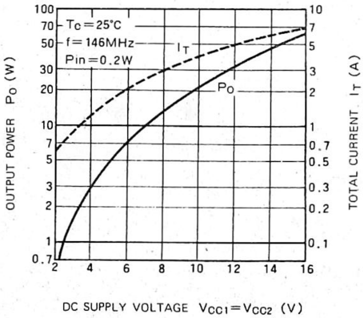
OUTPUT POWER, 1st STAGE CURRENT, TOTAL CURRENT VS. INPUT POWER



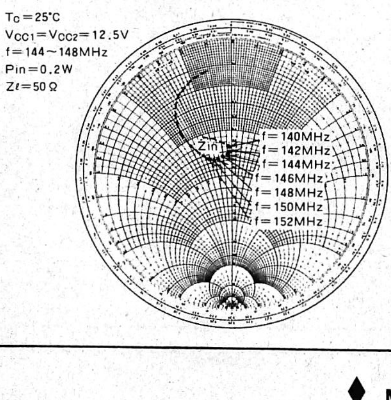
OUTPUT POWER, FINAL STAGE CURRENT VS. 1st STAGE VOLTAGE



OUTPUT POWER, TOTAL CURRENT VS. DC SUPPLY VOLTAGE



INPUT INPEDANCE VS. FREQUENCY



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 8°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 2°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at stadard operation.

- Conditions for standard operation.
  $P_O = 28W$, $V_{CC} = 12.5V$, $P_{in} = 0.2W$, $\eta_T = 45\%$ (minimum rating), P_O1 (Note 1) $= 5W$, $I_T = 5.0A$ (I_{T1}[2] $=$ 0.9A, I_{T2}[3] $= 4.1A$)
  Note 1: Output power of the first stage transistor
  Note 2: Circuit current of the first stage transistor
  Note 3: Circuit current of the final stage transistor
- Junction temperature of the first stage transistor
  $T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C$[4]
  $= (12.5 \times 0.9 - 5 + 0.2) \times 8 + T_C$
  $= 52 + T_C$ (°C)
  Note 4: Package temperature of device
- Junction temperature of the final stage transistor
  $T_{j2} = (V_{CC} \times I_{T2} - P_O + P_{O1}) \times R_{th(j-c)2} + T_C$
  $= (12.5 \times 4.1 - 28 + 5) \times 2 + T_C$
  $= 57 + T_C$ (°C)

2. Heat sink design;

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60°C$) and at the output power of 28W below 90°C.

The thermal resistance $R_{th(c-a)}$[5] of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(28/0.45) - 28 + 0.2}$$
$$= 0.87\ (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 142°C$, $T_{j2} = 147°C$ at $T_a = 60°C$, $T_C = 90°C$.

In the annual average of ambient temperature is 30°C,

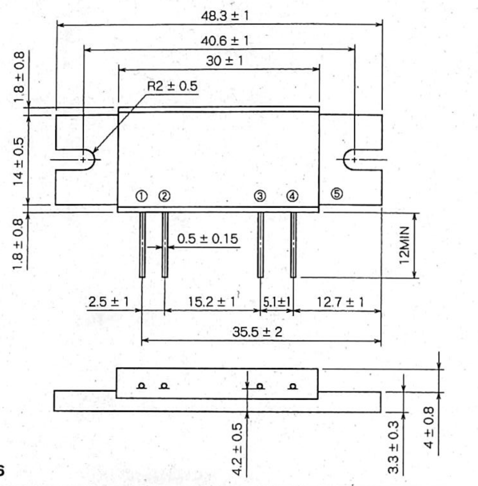
$T_{j1} = 112°C$, $T_{j2} = 118°C$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57739C

824~849MHz, 12.5V, 6W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC Supply		16	V
V_{CC2}	2nd. DC Supply		17	V
I_{CC}	Total current	$Z_G = Z_L = 50\ \Omega$	3	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 12.5V$	100	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 12.5V$	12	W
$T_{C(OP)}$	Operation case temperature	$Z_G = Z_L = 50\ \Omega$	−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

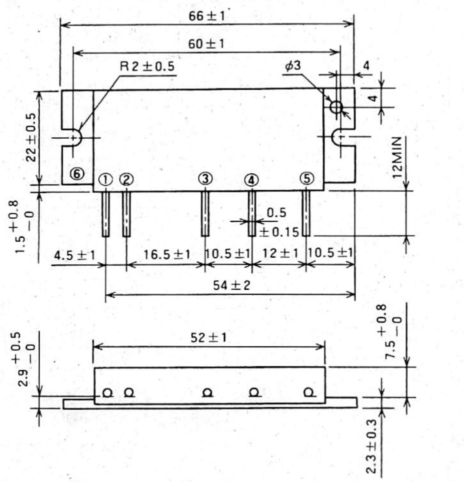
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$V_{CC1} = V_{CC2} = 12.5V$, $P_{in} = 30mW$, $Z_G = Z_L = 50\ \Omega$	824	849	MHz
Po	Output power		6		W
η_T	Total efficiency		35		%
2fo, 3fo	2nd, 3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = 15.2V$, Po = 6W ($P_{in}$: controlled), $Z_G = 50\Omega$, Load VSWR=20:1 (All phase), 5sec.	No degradation		−

MITSUBISHI ELECTRIC

M57744

889~915MHz, 12.5V, 13W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

PIN :
① Pin : RF INPUT
② V_{CC1} : 1st. DC SUPPLY
③ V_{CC2} : 2nd. DC SUPPLY
④ V_{CC3} : 3rd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS ($T_c = 25$℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 12.5V$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	18	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

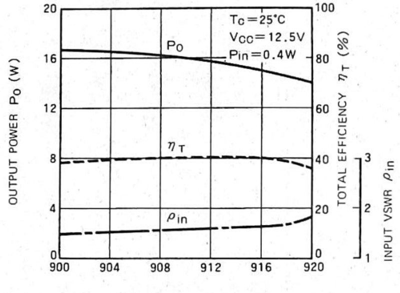
ELECTRICAL CHARACTERISTICS ($T_c = 25$℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$V_{CC1} = V_{CC2} = V_{CC3} = 12.5V$ $P_{in} = 0.4W$ $Z_G = Z_L = 50\ \Omega$	889	915	MHz
Po	Output power		13		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−25	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = V_{CC3} = 15.2V$ $P_O = 14W$ (P_{in} : controlled) Load VSWR=20:1 (All phase), 2sec.	No degradation		−

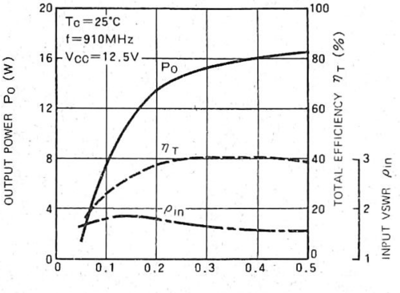
MITSUBISHI ELECTRIC

TYPICAL CHARACTERISTICS

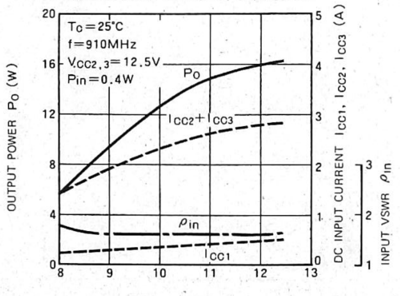
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. INPUT POWER



OUTPUT POWER, EACH STAGE DC CURRENT, INPUT VSWR VS. FIRST-STAGE SUPPLY VOLTAGE



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 15^\circ C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 6^\circ C/W$ (Typ.)

c) Final stage transistor

$R_{th(j-c)3} = 2.5^\circ C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at stadard operation.

- Conditions for standard operation.
  $P_o = 13W$, $V_{CC} = 12.5V$, $P_{in} = 0.4W$, $\eta_T = 35\%$ (minimum rating), P_{o1} (Note 1) $= 1.6W$, P_{o2} (2) $= 6W$, $I_T = 3.0A$ (I_{T1} (3) $= 0.25A$, I_{T2} (4) $= 0.75A$, I_{T3} (5) $= 2A$)

  Note 1: Output power of the first stage transistor
  Note 2: Output power of the second stage transistor
  Note 3: Circuit current of the first stage transistor
  Note 4: Circuit current of the second stage transistor
  Note 5: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$$\begin{aligned} T_{j1} &= (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c^{(6)} \\ &= (12.5 \times 0.25 - 1.6 + 0.4) \times 15 + T_c \\ &= 29 + T_c\ (^\circ C) \end{aligned}$$

  Note 6: Package temperature of device

- Junction temperature of the second stage transistor

$$\begin{aligned} T_{j2} &= (V_{CC} \times I_{T2} - P_{o2} + P_{o1}) \times R_{th(j-c)2} + T_c \\ &= (12.5 \times 0.75 - 6 + 1.6) \times 6 + T_c \\ &= 29.9 + T_c\ (^\circ C) \end{aligned}$$

- Junction temperature of the final stage transistor

$$\begin{aligned} T_{j3} &= (V_{CC} \times I_{T3} - P_o + P_{o2}) \times R_{th(j-c)3} + T_c \\ &= (12.5 \times 2 - 13 + 6) \times 2.5 + T_c \\ &= 45 + T_c\ (^\circ C) \end{aligned}$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60^\circ C$) and at the output power of 13W below $90^\circ C$.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(13/0.35) - 13 + 0.4} = 1.2\ (^\circ C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 119^\circ C$, $T_{j2} = 120^\circ C$, $T_{j3} = 135^\circ C$ at $T_a = 60^\circ C$, $T_c = 90^\circ C$.

In the annual average of ambient temperature is $30^\circ C$,

$T_{j1} = 89^\circ C$, $T_{j2} = 90^\circ C$, $T_{j3} = 105^\circ C$.

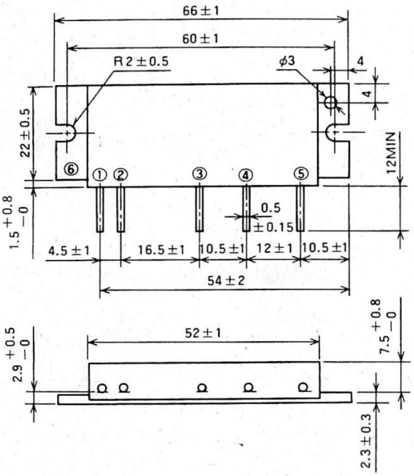
As the maximum junction temperature of these incorporated transistors T_{jmax} are $175^\circ C$, application under fully derated condition is ensured.

M57745

430~450MHz, 12.5V, 33W, SSB MOBILE RADIO

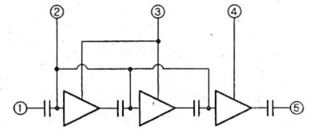
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VBB : BASE BIAS
③VCC1 : 1st. DC SUPPLY
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
V_{BB}			10	V
I_{CC}	Total current		10	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

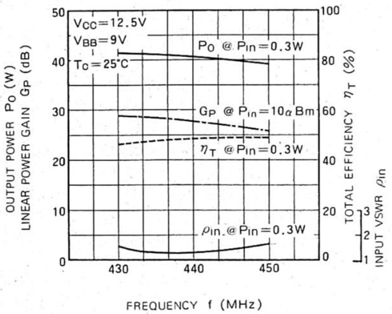
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.3W$ $V_{CC} = 12.5V$ $V_{BB} = 9V$ $Z_G = Z_L = 50\ \Omega$	430	450	MHz
P_O	Output power		33		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $V_{BB} = 9V$ $P_O = 30W$ (P_{in} : controlled) Load VSWR=8.8:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

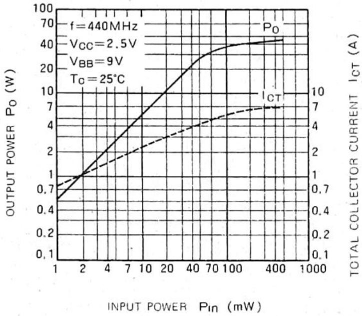
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

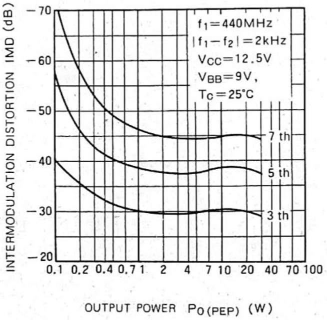
OUTPUT POWER, LINEAR POWER GAIN, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



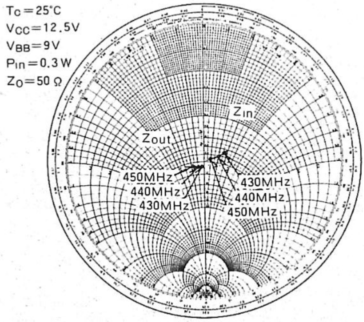
OUTPUT POWER, TOTAL COLLECTOR CURRENT, VS. INPUT POWER



INTERMODULATION DISTORTION VS. OUTPUT POWER



INPUT IMPEDANCE, OUTPUT IMPEDANCE VS. FREQUENCY



DESIGN CONSIDERATION OF HEAT RADIATION.

Please refer to following consideration when designing heat shink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 12°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 4°C/W$ (Typ.)

c) Final stage transistor

$R_{th(j-c)3} = 1.75°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

$P_o = 30W$, $V_{CC} = 12.5V$, $P_{in} = 0.3W$, $\eta_T = 40\%$ (minimum rating), P_{o1} (Note 1) $= 2W$, P_{o2} (2) $= 8W$, $I_T = 6A$ (I_{T1} (3) $= 0.35A$, I_{T2} (4) $= 1.32A$, I_{T3} (5) $= 4.33A$)

Note 1: Output power of the first stage transistor
Note 2: Output power of the second stage transistor
Note 3: Circuit current of the first stage transistor
Note 4: Circuit current of the second stage transistor
Note 5: Circuit current of the final stage transistor

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_C{}^{(6)}$$
$$= (12.5 \times 0.35 - 2 + 0.3) \times 12 + T_C$$
$$= 32 + T_C \ (°C)$$

Note 6: Package temperature of device

- Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_{o2} + P_{o1}) \times R_{th(j-c)2} + T_C$$
$$= (12.5 \times 1.32 - 8 + 2) \times 4 + T_C$$
$$= 42 + T_C \ (°C)$$

- Junction temperature of the final stage transistor

$$T_{j3} = (V_{CC} \times I_{T3} - P_o + P_{o2}) \times R_{th(j-c)3} + T_C$$
$$= (12.5 \times 4.33 - 30 + 8) \times 1.75 + T_C$$
$$= 56 + T_C \ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the output power of 30W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(30/0.4) - 30 + 0.3}$$
$$= 0.66 \ (°C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink.

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 122°C$, $T_{j2} = 132°C$, $T_{j3} = 146°C$ at $T_a = 60°C$, $T_C = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 92°C$, $T_{j1} = 102°C$, $T_{j3} = 116°C$.

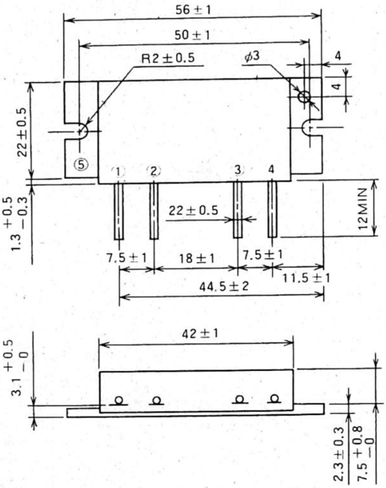
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57747

144~148MHz, 12.5V, 13W, FM MOBILE RADIO

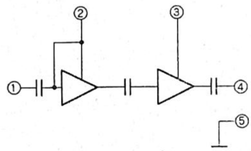
OUTLINE DRAWING

Dimensions in mm



H6

BLOCK DIAGRAM



PINNING :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : FINAL DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$V_{CC1} \leqq 12.5V$, $Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	Same as above	20	W
$T_{C(OP)}$	Operation case temperature	Same as above	− 30～+ 110	℃
T_{stg}	Storage temperature		− 40～+ 110	℃

Note : Above parameters are guaranteed independently.

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

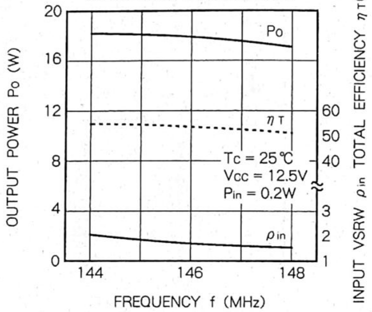
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	144	148	MHz
P_O	Output power		13		W
η_T	Total efficiency		48		%
2fo	2nd. harmonic			− 25	dB
3fo	3rd. harmonic			− 35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$ $P_O = 14W$ (P_{in} : controlled) $\rho_L = 20 : 1$ (All phase) $Z_G = 50\ \Omega$	No degradation or destroy		−

Above parameters, ratings, limits and conditions are subject to change.

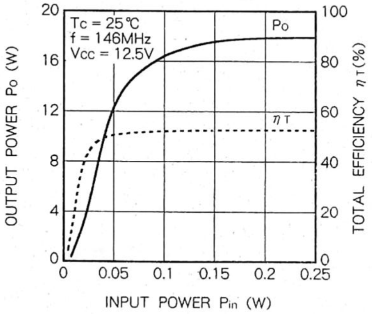
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

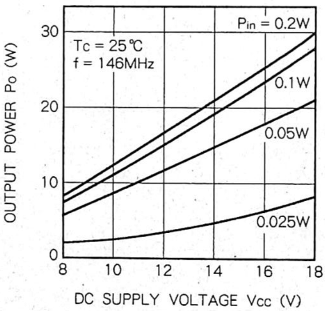
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



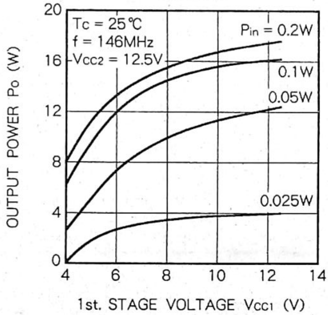
OUTPUT POWER TOTAL EFFICIENCY, VS. INPUT POWER



OUTPUT POWER VS. DC SUPPLY VOLTAGE



OUTPUT POWER VS. 1st STAGE VOLTAGE



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 10℃/W(Typ.)$

b) Final stage transistor

$R_{th(j-c)2} = 3℃/W(Typ.)$

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

  $P_o = 13W$, $V_{CC} = 12.5V$, $P_{in} = 0.2W$, $\eta T = 48\%$ (minimum rating). P_{o1}(Note1) $= 2.5W$, $I_T = 2.2A(I_{T1}$(2) $= 0.45A$, I_{T2}(3) $= 1.75A)$

  Note1 : Output power of the first stage transistor

  Note2 : Circuit current of the first stage transistor

  Note3 : Circuit current of the first stage transistor

- Junction temperature of the first stage transistor

  $T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c$(4)

  $= (12.5 \times 0.45 - 2.5 + 0.2) \times 10 + T_c$

  $= 33 + T_c(℃)$

  Note4 : Package temperature of device

- Junction temperature of the final stage transistor

  $T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_c$

  $= (12.5 \times 1.75 - 13 + 2.5) \times 3 + T_c$

  $= 34 + T_c(℃)$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60℃$) and at the output power of 13W below 90℃.

The thermal resistance $R_{th(c-a)}$(5) of the heat sink to realize this :

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta T) - P_o + P_{in}} = \frac{90 - 60}{(13/0.48) - 13 + 0.2}$$

$$= 2.8(℃/W)$$

Note5 : Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 113℃$, $T_{j2} = 134℃$ at $T_a = 60℃$, $T_c = 90℃$,

In the annual average of ambient temperature is 30℃,

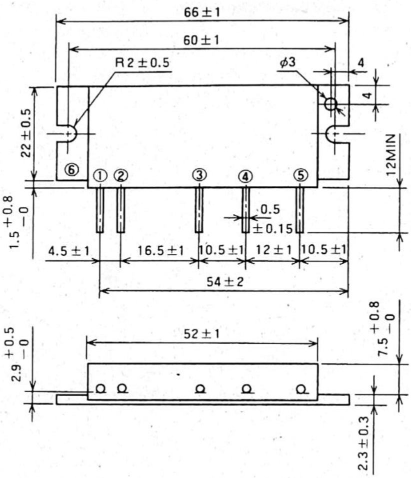
$T_{j1} = 103℃$, $T_{j2} = 104℃$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175℃, application under fully derated condition is ensured.

M57749

903~905MHz, 12.5V, 7W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		3	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 12.5V$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

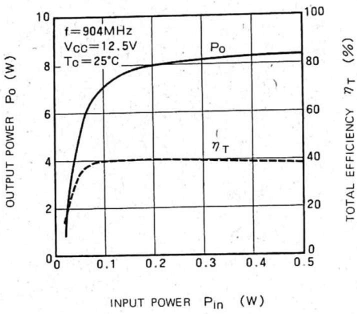
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = V_{CC3} = 12.5V$ $P_{in} = 0.2W$ $Z_G = Z_L = 50\ \Omega$	903	905	MHz
Po	Output power		7		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = V_{CC3} = 15.2V$ Po = 7W (P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 2sec.	No degradation		−

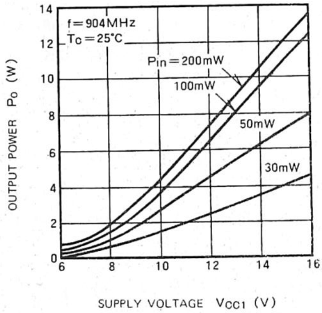
MITSUBISHI ELECTRIC

TYPICAL CHARACTERISTICS

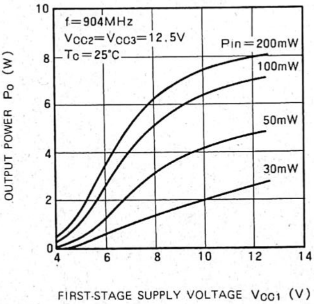
OUTPUT POWER, TOTAL EFFICIENCY VS. INPUT POWER



OUTPUT POWER VS. SUPPLY VOLTAGE



OUTPUT POWER VS. FIRST-STAGE SUPPLY VOLTAGE



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 13°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 9°C/W$ (Typ.)

c) Final stage transistor

$R_{th(j-c)3} = 4°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at stadard operation.

Conditions for standard operation.

$P_o = 7W$, $V_{CC} = 12.5V$, $P_{in} = 0.2W$, $\eta_T = 30\%$ (minimum rating), P_{o1} (Note 1) $= 1.5W$, P_{o2} (2) $= 3.6W$, $I_T = 1.87A$ (I_{T1} (3) $= 0.21A$, I_{T2} (4) $= 0.48A$, I_{T3} (5) $= 1.17A$)

Note 1: Output power of the first stage transistor
Note 2: Output power of the second stage transistor
Note 3: Circuit current of the first stage transistor
Note 4: Circuit current of the second stage transistor
Note 5: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_c{}^{(6)}$$
$$= (12.5 \times 0.21 - 1.5 + 0.2) \times 13 + T_c$$
$$= 17 + T_c \ (°C)$$

Note 6: Package temperature of device

Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_{o2} + P_{o1}) \times R_{th(j-c)2} + T_c$$
$$= (12.5 \times 0.48 - 3.6 + 1.5) \times 9 + T_c$$
$$= 35 + T_c \ (°C)$$

Junction temperature of the final stage transistor

$$T_{j3} = (V_{CC} \times I_{T3} - P_o + P_{o2}) \times R_{th(j-c)3} + T_c$$
$$= (12.5 \times 1.17 - 7 + 3.6) \times 4 + T_c$$
$$= 45 + T_c \ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambinet temperature (normally $T_a = 60°C$) and at the output power of 7W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_c - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(7/0.3) - 7 + 0.2}$$
$$= 1.81 \ (°C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 107°C$, $T_{j2} = 125°C$, $T_{j3} = 135°C$ at $T_a = 60°C$, $T_c = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 77°C$, $T_{j2} = 95°C$, $T_{j3} = 105°C$.

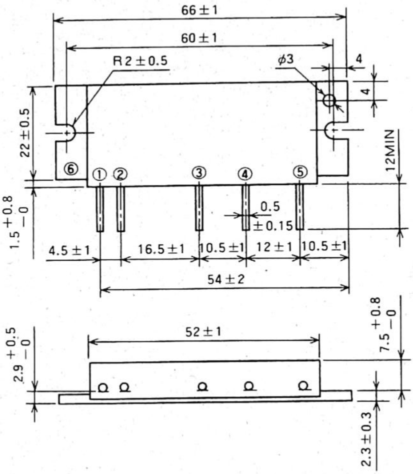
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57752

430~450MHz, 12.5V, 13W, FM MOBILE RADIO

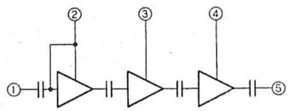
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

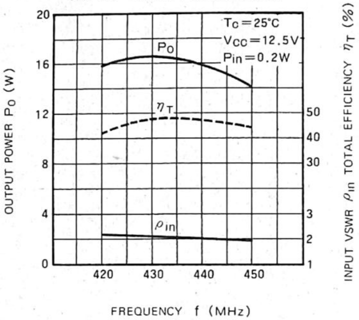
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.4	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

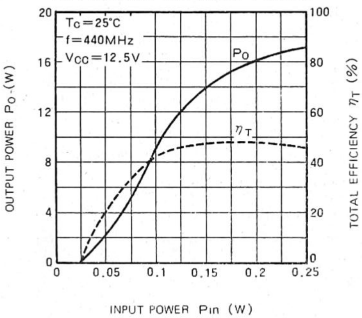
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.2W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	430	450	MHz
P_O	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_O = 13W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

TYPICAL PERFORMANCE DATA

OUTPUT POWER TOTAL EFFICIENCY
INPUT VSWR FREQUENCY

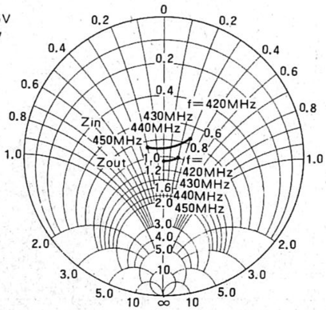


OUTPUT POWER TOTAL
EFFICIENCY VS. INPUT POWER



INPUT IMPEDANCE VS. FREQUENCY

Tc=25°C
Vcc=12.5V
Pin=0.2W
Zo=50 Ω

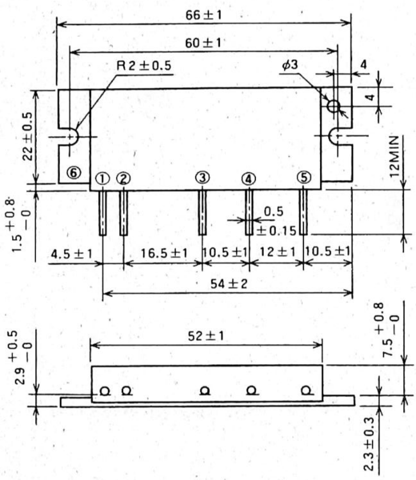


M57755

806~866MHz, 12.6V, 10W, FM MOBILE RADIO

OUTLINE DRAWING

Dimensions in mm



H3

PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC supply		14	V
V_{CC2}	2nd. DC supply		17	V
V_{CC3}	3rd. DC supply		17	V
I_{CC}	Total current	$Z_G = Z_L = 50\Omega$	7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\Omega$, $V_{CC1} \leqq 12.6V$	0.8	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\Omega$	30	W
$T_{C(OP)}$	Operation case temperature	$Z_G = Z_L = 50\Omega$	−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

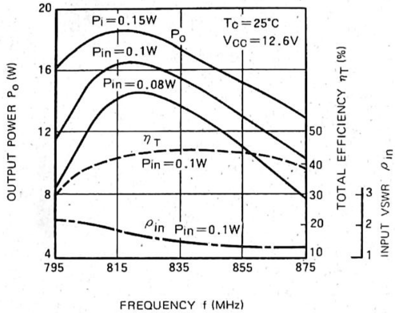
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$V_{CC1} = V_{CC2} = V_{CC3} = 12.6V$ $P_{in} = 0.1W$ $Z_G = Z_L = 50\Omega$	806	866	MHz
Po	Output power		10		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = V_{CC3} = 15.2V$ $P_o = 10W$ (P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

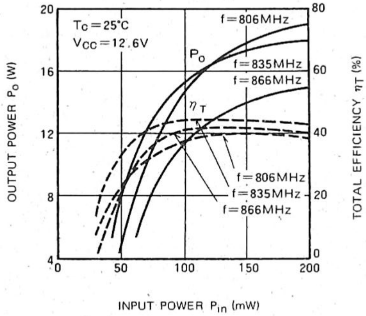
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

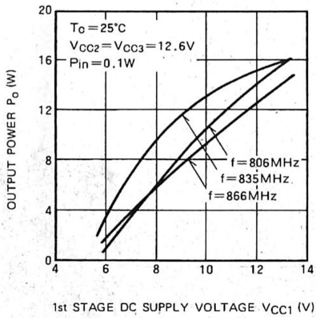
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



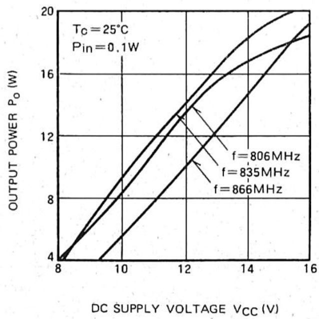
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER



OUTPUT POWER VS. 1st STAGE VOLTAGE



OUTPUT POWER VS. DC SUPPLY VOLTAGE



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operaton.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 15°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 6.5°C/W$ (Typ.)

c) Final stage transistor

$R_{th(j-c)3} = 4°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.
  $P_O = 10W$, $V_{CC} = 12.6V$, $P_{in} = 0.1W$, $\eta_T = 35\%$ (minimum rating), P_{O1} (Note 1) $= 1W$, P_{O2} (2) $= 4W$, $I_T = 2.26A$ (I_{T1} (3) $= 0.3A$, I_{T2} (4) $= 0.56A$, I_{T3} (5) $= 1.4A$)
  Note 1: Output power of the first stage transistor
  Note 2: Output power of the second stage transistor
  Note 3: Circuit current of the first stage transistor
  Note 4: Circuit current of the second stage transistor
  Note 5: Circuit current of the final stage transisotr
- Junction temperature of the first stage transistor
  $$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C{}^{(6)}$$
  $$= (12.6 \times 0.3 - 1.0 + 0.1) \times 15 + T_C$$
  $$= 43.2 + T_C\ (°C)$$
  Note 6: Package temperature of device
- Junction temperature of the second stage transistor
  $$T_{j2} = V_{CC} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$$
  $$= (12.6 \times 0.56 - 4 + 1.0) \times 6.5 + T_C$$
  $$= 26.4 + T_C\ (°C)$$
- Junction temperature of the final stage transistor
  $$T_{j3} = (V_{CC} \times I_{T3} - P_O + P_{O2}) \times R_{th(j-c)3} + T_C$$
  $$= (12.6 \times 1.4 - 10 + 4) \times 4 + T_C$$
  $$= 46.6 + T_C\ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the output power of 10W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(10/0.35) - 10 + 0.1}$$

$$= 1.6\ (°C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 133.2°C$, $T_{j2} = 116.4°C$, $T_{j3} = 136.6°C$ at $T_a = 60°C$, $T_C = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 103.2°C$, $T_{j2} = 86.4°C$, $T_{j3} = 106.6°C$.

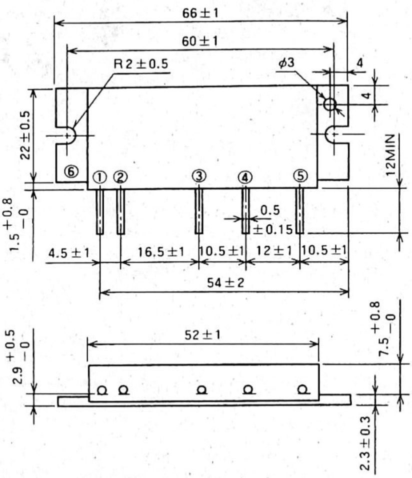
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57762

1.24~1.3GHz, 12.5V, 18W, SSB MOBILE RADIO

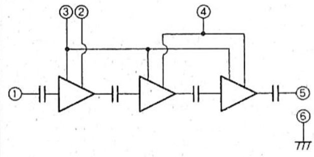
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS DC SUPPLY
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
V_{BB}	Base bias voltage		10	V
I_{CC}	Total current		8	A
$P_{in(max)}$	Input power	V_{CC1}=12.5V, V_{BB}=9V, Z_G=Z_L=50Ω	2	W
$P_{O(max)}$	Output power	Z_G = Z_L = 50 Ω	25	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

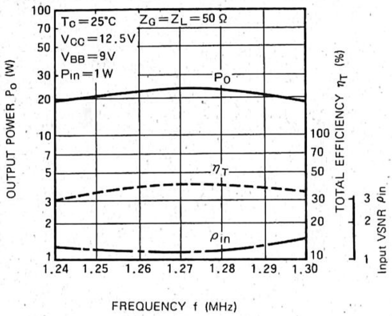
ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	V_{CC1} = V_{CC2} = 12.5V V_{BB} = 9V P_{in} = 1W Z_G = Z_L = 50 Ω	1.24	1.3	GHz
P_O	Output power		18		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−45	dB
ρ_{in}	Input VSWR			2.0	−
I_{BB}	Base bias current			500	mA
G_P	Linear power gain	V_{CC1} = V_{CC2} = 12.5V, V_{BB} = 9V, P_{in} = 10dBm, Z_G = Z_L = 50Ω	13		dB
IMD_3	3rd. intermodulation	V_{CC1}=V_{CC2}=12.5V, V_{BB}=9V, Δf=10kHz, $P_{O(PEP)}$ ≦ 14W, Z_G=Z_L=50Ω		−24	dBc
IMD_5	5th. intermodulation			−31	dBc
−	Load VSWR tolerance	V_{CC1}=V_{CC2}=15.2V, V_{BB}=9V, P_O=18W (P_{in}:controlled), Z_G=50Ω Load VSWR=16:1 (All phase), 5sec.	No degradation		−

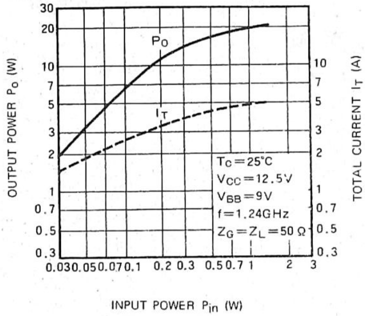
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

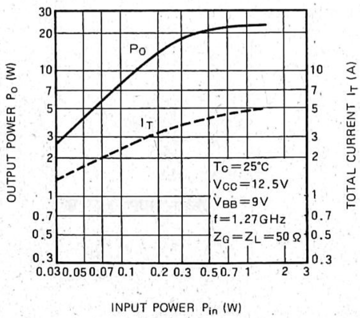
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



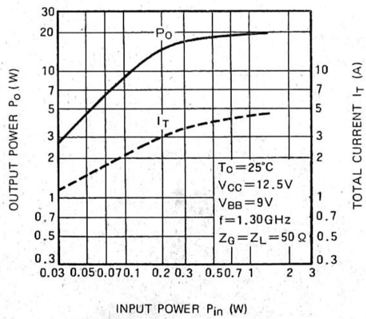
OUTPUT POWER, TOTAL CURRENT, VS. INPUT POWER CHARACTERISTICS



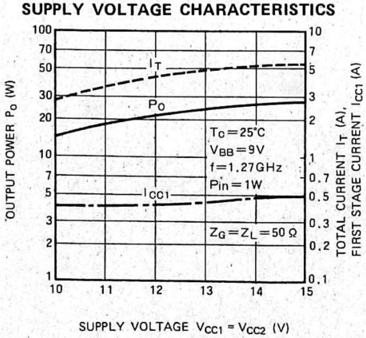
OUTPUT POWER, TOTAL CURRENT, VS. INPUT POWER CHARACTERISTICS



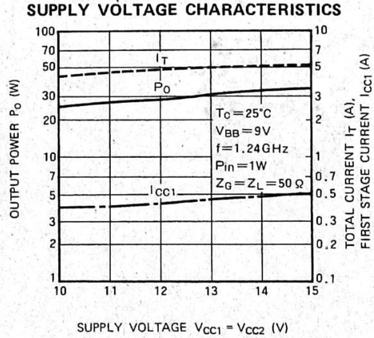
OUTPUT POWER, TOTAL CURRENT, VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

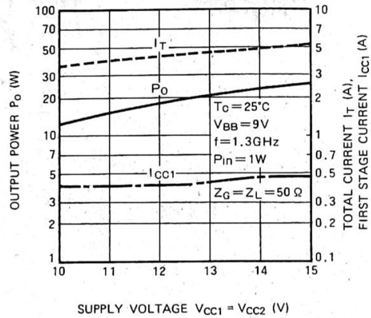


OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

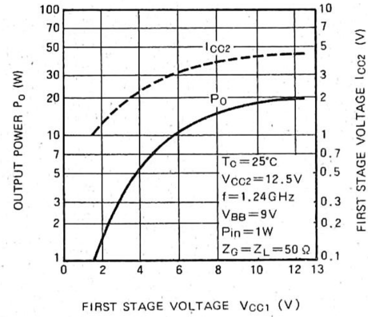


MITSUBISHI ELECTRIC

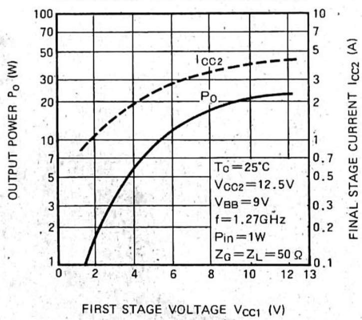
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



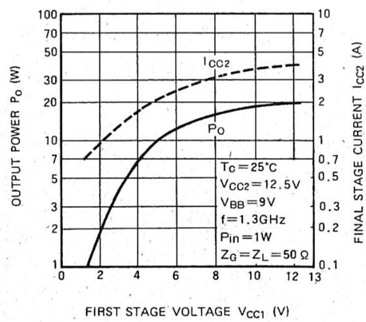
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE CURRENT CHARACTERISTICS

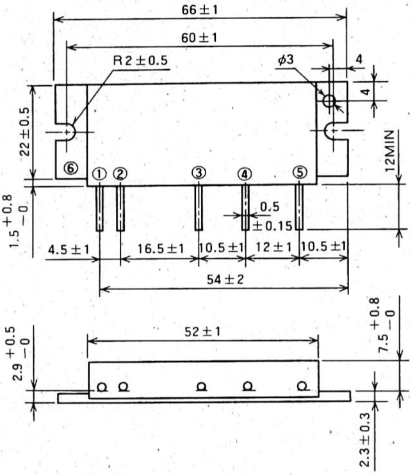


M57764

806~825MHz, 12.5V, 20W, FM MOBILE RADIO

OUTLINE DRAWING

Dimensions in mm



H3

PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

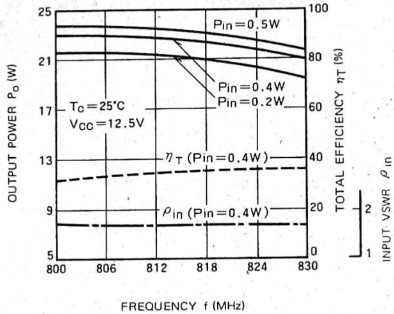
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$, $V_{CC1} \leqq 12.5V$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	25	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

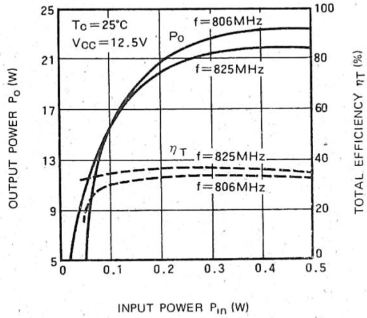
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = V_{CC3} = 12.5V$ $P_{in} = 0.4W$ $Z_G = Z_L = 50\,\Omega$	806	825	MHz
Po	Output power		20		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = V_{CC3} = 15.2V$ P_O = 20W (P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

TYPICAL PERFORMANCE DATA

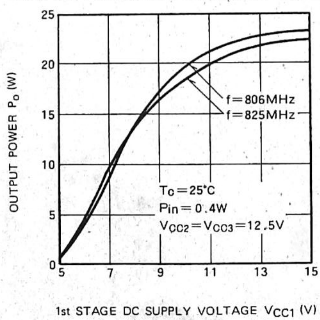
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



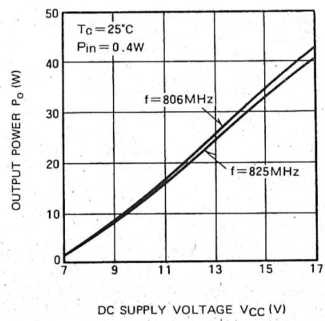
OUTPUT POWER, TOTAL EFFICIENCY, VS. INPUT POWER



OUTPUT POWER VS. 1st STAGE VOLTAGE



OUTPUT POWER VS. DC SUPPLY VOLTAGE



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operaton.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 15°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 5°C/W$ (Typ.)

c) Final stage transistor

$R_{th(j-c)3} = 1.87°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.

P_O = 20W, V_{CC} = 12.5V, P_{in} = 0.4W, η_T = 30% (minimum rating), P_{O1} (Note 1) = 3W, P_{O2} (2) = 10W, I_T = 5.33A (I_{T1} (3) = 0.4A, I_{T2} (4) = 1.53A, I_{T3} (5) = 3.4A)

Note 1: Output power of the first stage transistor
Note 2: Output power of the second stage transistor
Note 3: Circuit current of the first stage transistor
Note 4: Circuit current of the second stage transistor
Note 5: Circuit current of the final stage transisotr

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C{}^{(6)}$$
$$= (12.5 \times 0.4 - 3 + 0.4) \times 15 + T_C$$
$$= 36 + T_C \ (°C)$$

Note 6: Package temperature of device

- Junction temperature of the second stage transistor

$$T_{j2} = V_{CC} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$$
$$= (12.5 \times 1.53 - 10 + 3) \times 5 + T_C$$
$$= 60.6 + T_C \ (°C)$$

- Junction temperature of the final stage transistor

$$T_{j3} = (V_{CC} \times I_{T3} - P_O + P_{O2}) \times R_{th(j-c)3} + T_C$$
$$= (12.5 \times 3.4 - 20 + 10) \times 1.87 + T_C$$
$$= 60.8 + T_C \ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally T_a = 60°C) and at the output power of 20W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(20/0.3) - 20 + 0.4}$$
$$= 0.637 \ (°C/W)$$

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

T_{j1} = 126°C, $T_j{}^2$ = 150.6°C, T_{j3} = 150.8°C at T_a = 60°C, T_C = 90°c.

In the annual average of ambient temperature is 30°C,

T_{j1} = 96°C T_{j2} = 120.6°C, T_{j3} = 120.8°C.

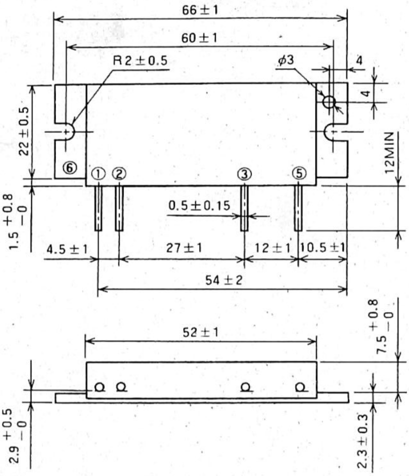
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57774

220~225MHz, 12.5V, 30W, FM MOBILE RADIO

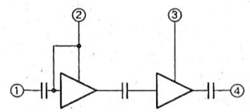
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

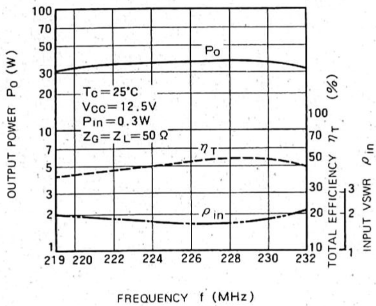
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 0.3W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	220	225	MHz
Po	Output power		30		W
η_T	Total efficiency		43		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $P_O = 30W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 5sec. $Z_G = 50\Omega$	No degradation		−

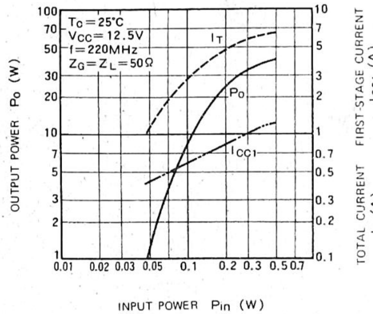
MITSUBISHI ELECTRIC

TYPICAL CHARACTERISTICS

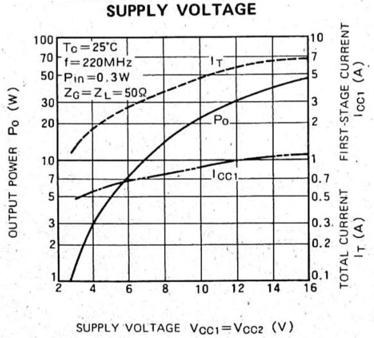
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY



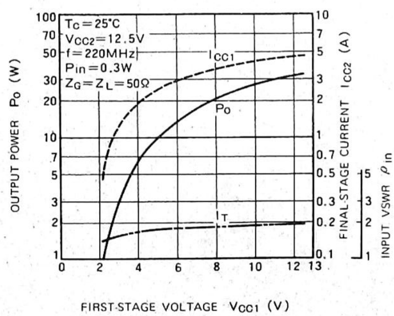
OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. INPUT POWER



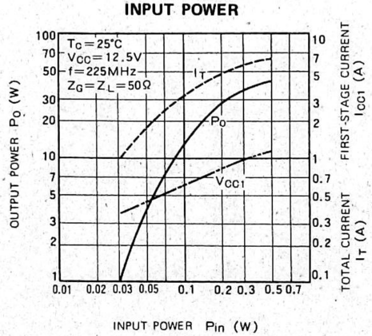
OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. SUPPLY VOLTAGE



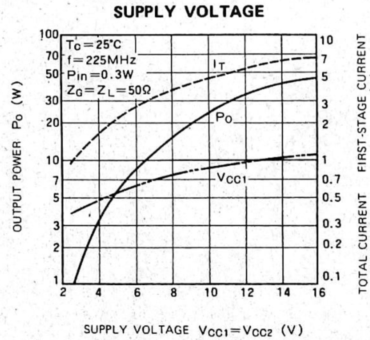
OUTPUT POWER, FINAL-STAGE CURRENT, INPUT VSWR VS. FIRST-STAGE VOLTAGE



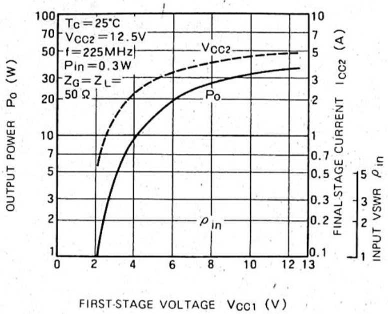
OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. INPUT POWER



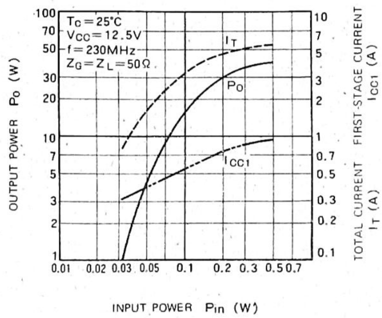
OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. SUPPLY VOLTAGE



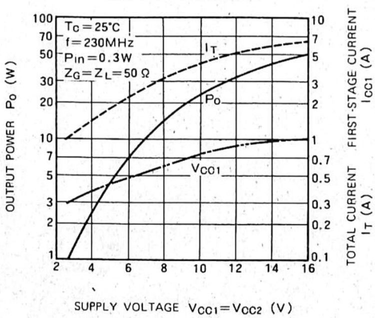
OUTPUT POWER, FINAL-STAGE CURRENT, INPUT VSWR VS. FIRST-STAGE VOLTAGE



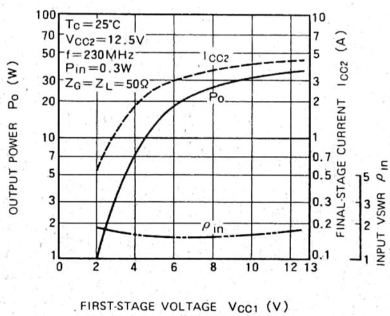
OUTPUT POWER, TOTAL CURRENT, FIRST-STAGE CURRENT VS. INPUT POWER



OUTPUT POWER, TOTAL CURRENT FIRST-STAGE CURRENT VS. SUPPLY VOLTAGE



OUTPUT POWER, FINAL-STAGE CURRENT, INPUT VSWR VS. FIRST-STAGE VOLTAGE



DESIGN CONSIDERATION OF HEAT RADIATION

Note the following when designing a heat sink:

1. Junction temperature of built-in transistor at standard operation

(1) Thermal resistance between junction of built-in transistors and case

Thermal resistance between junction of 1st stage transistor and case

$R_{th(j-c)1} = 8°C/W$ (typ.)

Thermal resistance between junction of final stage transistor and case

$R_{th(j-c)2} = 2°C/W$

(2) Junction temperature of built-in transistor at standard operation

- Standard operating conditions

  $P_O = 30W$, $V_{CC} = 12.5V$, $P_{in} = 0.3W$, $\eta_T = 43\%$ (rated minimum), $P_{O1} = 5W^{(Note\ 1)}$, $I_T = 5.6A$ ($I_{T1}{}^{(Note\ 2)} = 0.9A$, $I_{T2}{}^{(Note\ 3)} = 4.7A$)

  Note 1: Output power of 1st stage transistor

  Note 2: Current loss of 1st stage transistor

  Note 3: Current loss of final stage transistor

- Junction temperature of 1st stage transistor

  $$T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C{}^{(Note\ 4)}$$
  $$= (12.5 \times 0.9 - 5 + 0.3) \times 8 + T_C$$
  $$= 52 + T_C\ (°C)$$

  Note 4: Case temperature of device

- Junction temperature of final stage transistor

  $$T_{j2} = (V_{CC} \times I_{T2} - P_O + P_{O1}) \times R_{th(j-c)2} + T_C$$
  $$= 912.5 \times 4.7 - 30 + 5) \times 2 + T_C$$
  $$= 68 + T_C\ (°C)$$

2. Heat sink design

To design the thermal characteristics of a heat sink, keep the case temperature below 90°C when output power P_O is 28W and the upper limit of ambient temperature T_a is 60°C.

The thermal resistance $R_{th(c-a)}{}^{(Note\ 5)}$ of a heat sink to achieve this:

$$R_{th(c-a)} = \frac{T_C - T_a}{\dfrac{P_O}{\eta_T} - P_O + P_{in}} = \frac{90 - 60}{\dfrac{30}{0.43} - 30 + 0.3}$$

$$= 0.75\ (°C/W)$$

Note 5: Including the contact thermal resistance between the device and the heat sink

Mounting the device on the heat sink with the above thermal resistance, junction temperatures of each transistor module becomes as follows:

$T_{j1} = 142°C$, $T_{j2} = 158°C$ at $T_a = 60°C$, $T_C = 90°C$, Since the annual average of ambient temperature is 30°C, junction temperature of each transistor becomes as follows: $T_{j1} = 112°C$ and $T_{j2} = 17°C$.

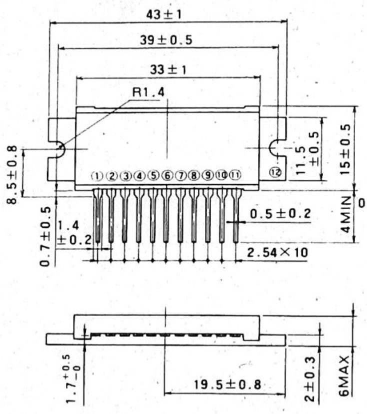
Use of these built-in transistors in temperatures below the maximum junction temperature T_{jmax} 175°C is guaranteed.

M57775

806~866MHz, 8V, 400mW, FM MOBILE RADIO

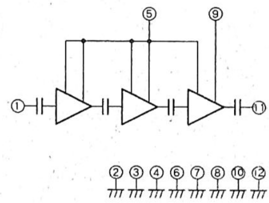
OUTLINE DRAWING

Dimensions in mm



H8

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
⑤VCC1 : 1st. DC SUPPLY
⑨VCC2 : 2nd. DC SUPPLY
⑪Po : RF OUTPUT
②③④ GND
⑥⑦⑧ GND
⑩ GND
⑫GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

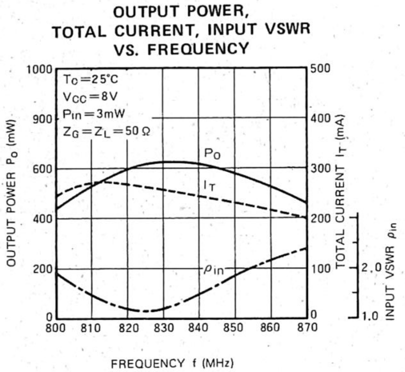
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC supply		11	V
V_{CC2}	2nd. DC supply		15	V
I_{CC}	Total current		0.6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 8V$	10	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	0.8	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

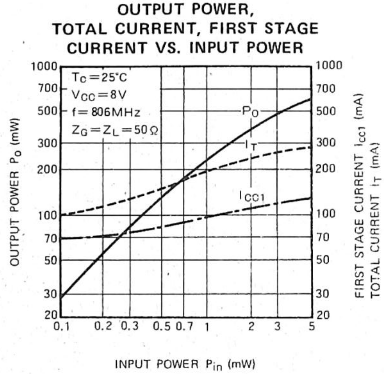
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

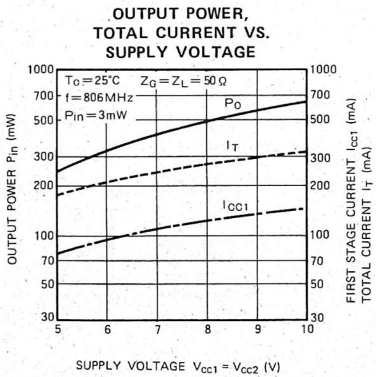
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$V_{CC1} = V_{CC2} = 8V$ $P_{in} = 3mW$ $Z_G = Z_L = 50\ \Omega$	806	866	MHz
Po	Output power		400		mW
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			3.0	−
I_T	Total current	$V_{CC1} = V_{CC2} = 8V$, $P_o = 0.4W$(P_{in} : controlled) $Z_G = Z_L = 50\Omega$		290	mA
−	Load VSWR tolerance	$V_{CC1} = 8V$, $V_{CC2} = 15V$ $P_o = 0.4W$(P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

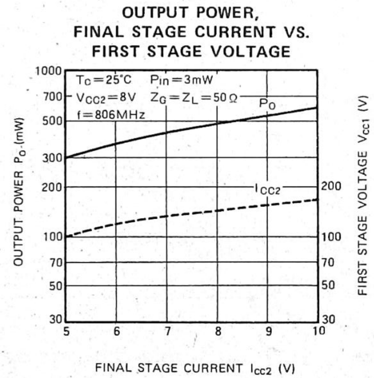
MITSUBISHI ELECTRIC

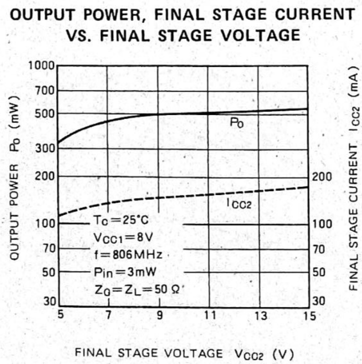
TYPICAL CHARACTERISTICS

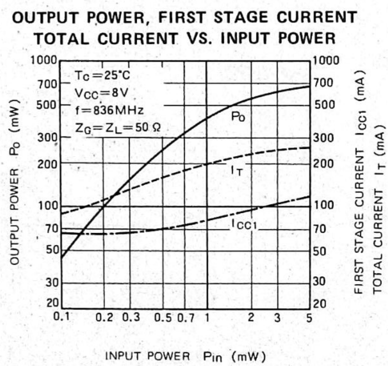




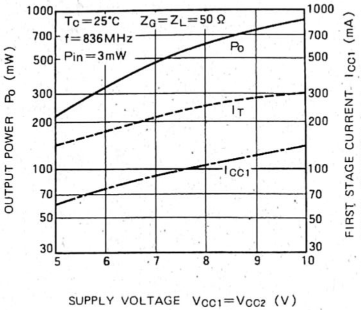




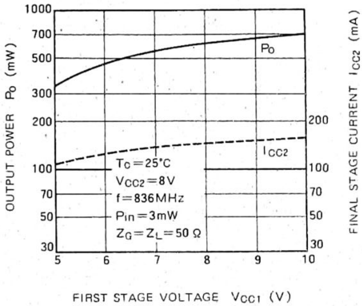




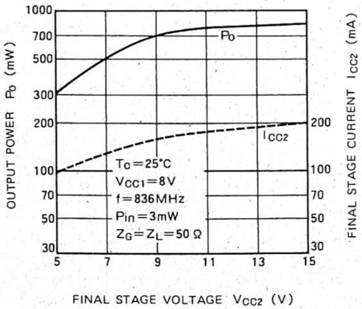
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE



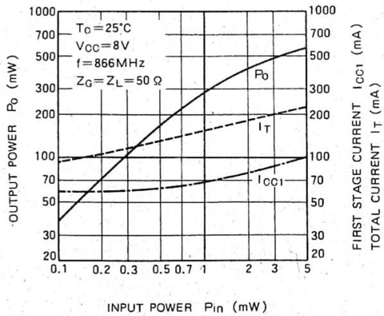
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE VOLTAGE



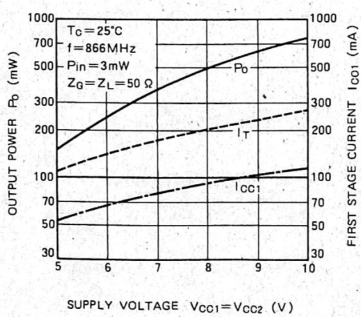
OUTPUT POWER, FINAL CURRENT VS. FINAL VOLTAGE



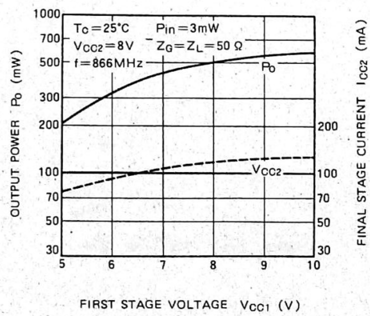
OUTPUT POWER, FIRST STAGE CURRENT, TOTAL CURRENT VS. INPUT POWER



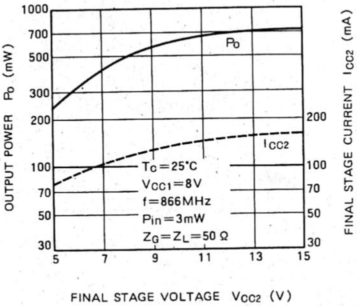
OUTPUT POWER, FIRST STAGE CURRENT, FINAL STAGE CURRENT VS. SUPPLY VOLTAGE



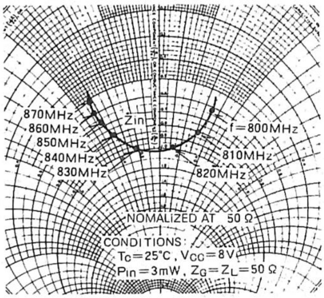
OUTPUT POWER, FINAL CURRENT VS. FIRST STAGE VOLTAGE



OUTPUT POWER, FINAL STAGE CURRENT VS. FINAL STAGE VOLTAGE



INPUT IMPEDANCE VS. FREQUENCY

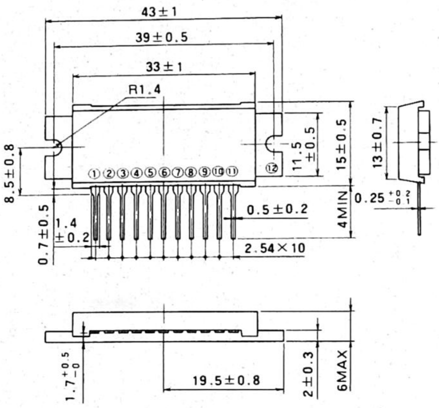


M57776

889~915MHz, 8V, 300mW, FM MOBILE RADIO

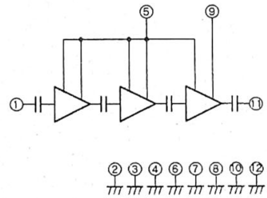
OUTLINE DRAWING

Dimensions in mm



H8

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
⑤V_{CC1} : 1st. DC SUPPLY
⑨V_{CC2} : 2nd. DC SUPPLY
⑪Po : RF OUTPUT
②③④ GND
⑥⑦⑧ GND
⑩ GND
⑫GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

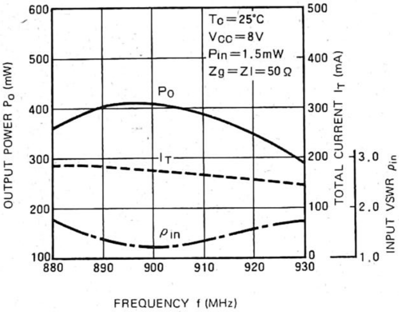
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC supply		11	V
V_{CC2}	2nd. DC supply		15	V
I_{CC}	Total current		0.6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 8V$	5	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

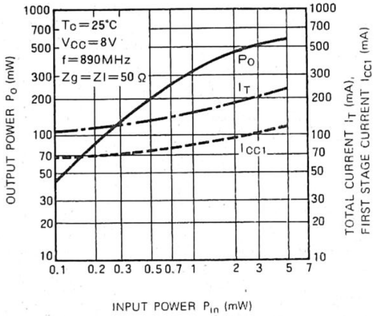
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = 8V$ $P_{in} = 1.5mW$ $Z_G = Z_L = 50\ \Omega$	889	915	MHz
Po	Output power		300		mW
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
I_T	Total current	$V_{CC1} = V_{CC2} = 8V$, Po = 0.3W(P_{in} : controlled) $Z_G = Z_L = 50\Omega$		250	mA
−	Load VSWR tolerance	$V_{CC1} = 8V$, $V_{CC2} = 15V$ Po = 0.3W(P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

TYPICAL PERFORMANCE DATA

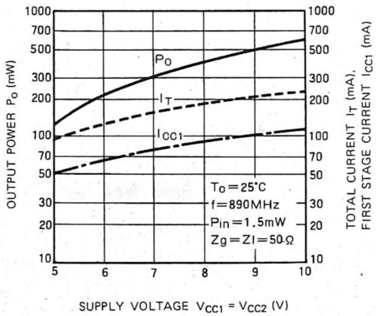
OUTPUT POWER, TOTAL CURRENT, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



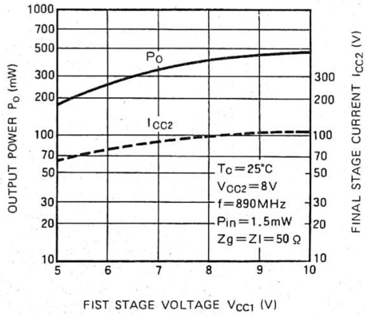
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



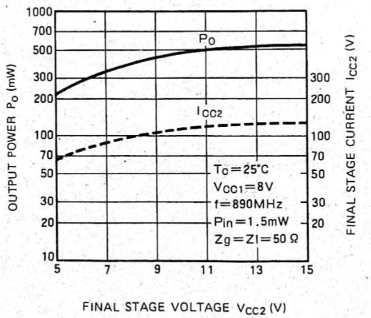
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



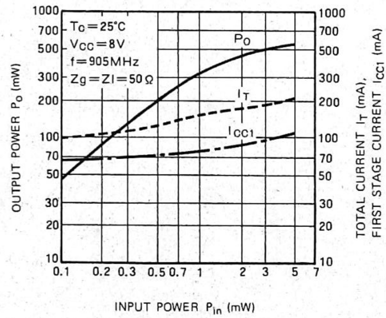
OUTPUT POWER, FINAL CURRENT, VS. FIRST STAGE CHARACTERISTICS



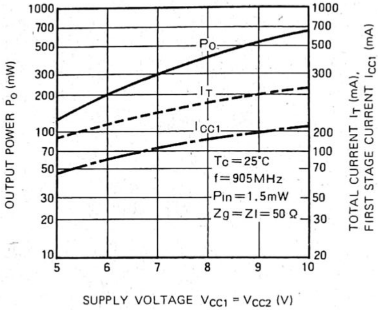
OUTPUT POWER, FINAL CURRENT VS. FINAL STAGE VOLTAGE CHARACTERISTICS



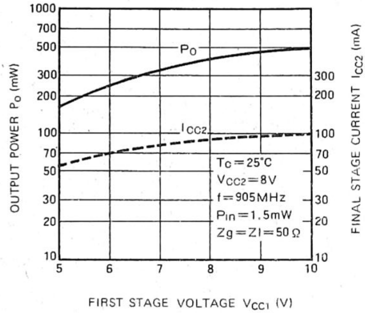
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



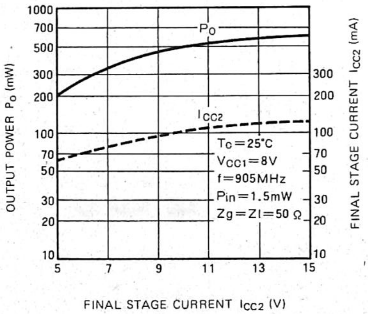
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



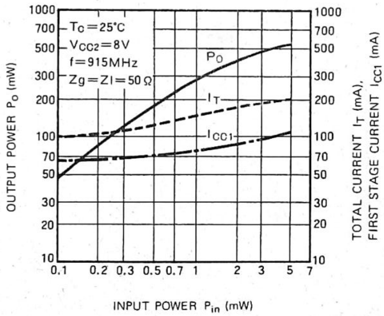
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE VOLTAGE CHARACTERISTICS



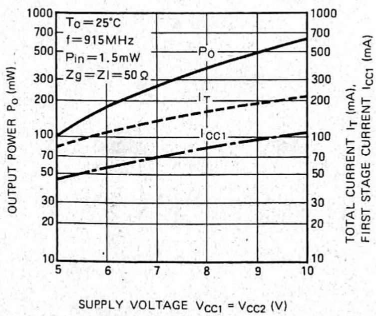
OUTPUT POWER, FINAL STAGE CURRENT FIAL STAGE VOLTAGE CHARACTERISTICS



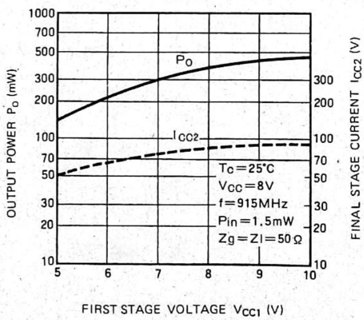
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



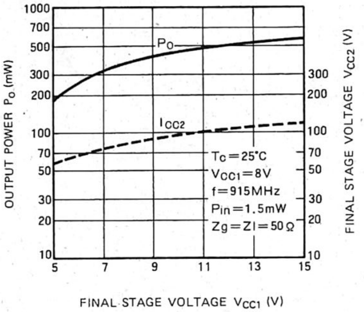
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE VOLTAGE CHARACTERISTICS



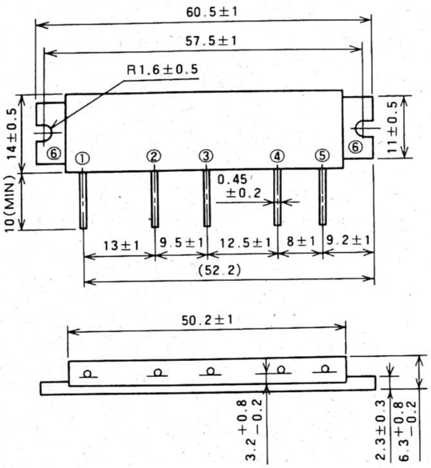
OUTPUT POWER, FINAL STAGE CURRENT VS. FINAL STAGE VOLTAGE CHARACTERISTICS



M57782

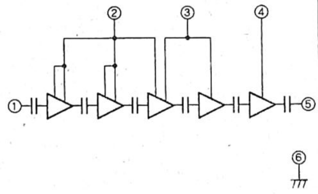
824~851MHz, 12.5V, 7W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC supply		9	V
V_{CC2}	2nd. DC supply		9	V
V_{CC3}	3rd. DC supply		17	V
I_{CC}	Total current	$Z_G = Z_L = 50\,\Omega$	4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$, $V_{CC1} \leq 8V$	7	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

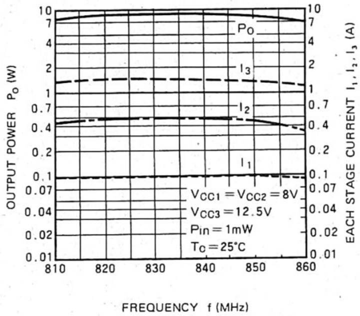
ELECTRICAL CHARACTERISTICS ($T_C = 25$℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$ $P_{in} = 1mW$ $Z_G = Z_L = 50\,\Omega$	824	851	MHz
Po	Output power		7		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	—
—	Load VSWR tolerance	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 15.2V$ Po = 7W (P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		—

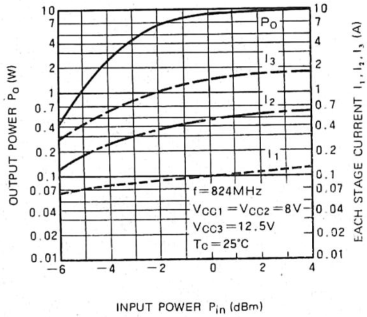
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

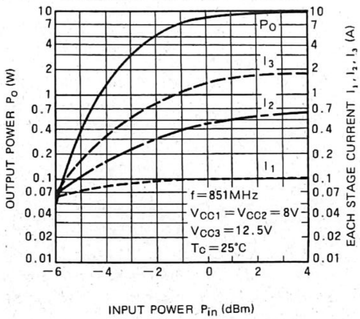
OUTPUT POWER, EACH STAGE CURRENT VS. FREQUENCY



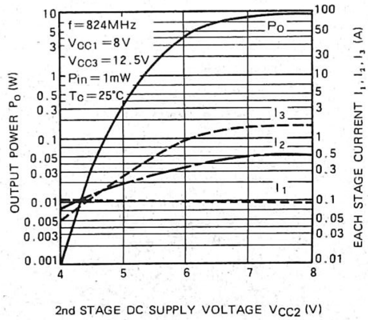
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



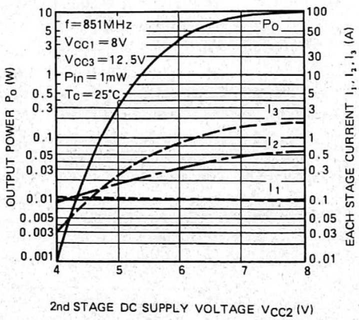
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



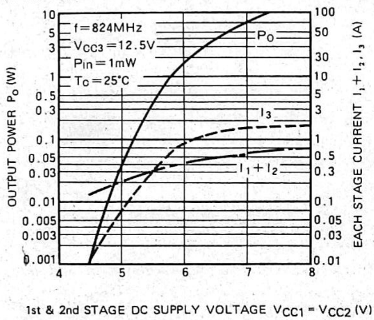
OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE

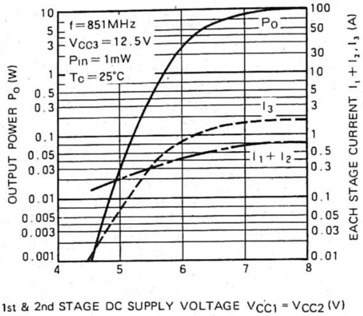


Table 1: The conditions at standard operation

Stage	Vcc (V)	I_T (mA)	Pin (mW)	Po (mW)
1st	8	45	1	20
2nd	8	80	20	200
3rd	8	160	200	500
4th	8	496	500	2000
5th	12.5	1100	2000	7000

DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to the following consideration when designing a heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistances between junction of incorporated transistors and case are shown in the followings.

a) First stage transistor

$R_{th(j-c)1} = 20°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 17.5°C/W$ (Typ.)

c) Third stage transistor

$R_{th(j-c)3} = 16°C/W$ (Typ.)

d) Fourth stage transistor

$R_{th(j-c)4} = 9°C/W$ (Typ.)

e) Final stage transistor

$R_{th(j-c)5} = 6.5°C/W$ (Typ.)

(2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

$P_O = 7W$, $V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$, $P_{in} = 1mW$, $\eta_T = 35\%$ (minimum ratings),

$I_{1+2} = 0.781A$ (Total current from 1st stage to 4th stage)

$I_3 = 1.1A$ (Current of 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

- Junction temperature of the first stage transistor

$T_{j1} = (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C$ (Note 1)
$= (8 \times 0.045 - 0.02 + 0.001) \times 20 + T_C$
$= 6.8 + T_C$ (°C)

Note 1: Case temperature of device

- Junction temperature of the second stage transistor

$T_{j2} = (V_{CC1} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$
$= (8 \times 0.08 - 0.2 + 0.02) \times 17.5 + T_C$
$= 8.1 + T_C$ (°C)

- Junction temperature of the third stage transistor

$T_{j3} = (V_{CC2} \times I_{T3} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_C$
$= (8 \times 0.16 - 0.5 + 0.2) \times 16 + T_C$
$= 15.7 + T_C$ (°C)

- Junction temperature of the fourth stage transistor

$T_{j4} = (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_C$
$= (8 \times 0.496 - 2 + 0.5) \times 9 + T_C$
$= 22.2 + T_C$ (°C)

- Junction temperature of the final stage transistor

$T_{j5} = (V_{CC3} \times I_{T5} - P_O + P_{O4}) \times R_{th(j-c)5} + T_C$
$= (12.5 \times 1.1 - 7 + 2) \times 6.5 + T_C$
$= 56.9 + T_C$ (°C)

2. Heat sink design

In thermal design of heat sink, keep the case temperature below 90°C at output power P_O = 7W and ambient temperature = 60°C.

The thermal resistance $R_{th(c-a)}$ (Note 2) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.35 - 7 + 0.001)}$$
$$= 2.31 \text{ (°C/W)}$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

T_{j1} = 97°C, T_{j2} = 99°C, T_{j3} = 106°C, T_{j4} = 113°C, T_{j5} = 147°C at T_a = 60°C, T_C = 90°C.

Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become;

T_{j1} = 67°C, T_{j2} = 69°C T_{j3} = 76°C, T_{j4} = 76°C, T_{j5} = 117°C

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

GENERAL

Mitsubishi RF Power Modules for mobile radio applications have high reliability and good performance, as they are designed and manufactured under strict quality control. However, the reliability of semiconductor devices is remarkably affected by usage conditions such as circuit constructions, mounting method, environments, etc.. In order to keep high reliability and obtain good performance when using Mitsubishi RF Power Modules, the following important points concerning maximum ratings, handling, etc., should be noted before use.

1. MAXIMUM RATINGS

Maximum ratings of the RF Power Modules are defined by the "Absolute Maximum Ratings" shown in separate specification sheet. Maximum ratings should not be exceeded in any circumstances, even momentarily. If a device is operated in excess of the absolute maximum ratings, the device may immediately be degraded or destroyed. Futhermore, in designing an electronic circuit using RF power Modules, it is necessary to note that the maximum ratings of the devices should not be exceeded even if external conditions are changed.

2. NORMAL OPERATING VOLTAGE

Normal operating voltage is 12.5 ~ 13.8 volts for Mitsubishi RF Power Modules, because they are designed for mobile radio applications. The regulated 9 volts is recommended for the base biasing voltage of the modules for linear power amplifiers (for SSB).

3. THERMAL DESIGN

In order to keep high reliability of the equipment, it is better to keep the module temperature low. The case temperature of the module, when operated standard conditions, is lower than 90°C under all severe ambient temperature, recommend normally 60°C.

4. MOUNTING and HANDLING

4-1 When the module is mounted on to a heat sink of a equipment, thermal compound to get good heat sinking should be applied between the module's fin and the heat sink. Following thermal compound for good heat sinking is recommended.
G746 Shinetsu Chemical Industry Co., Ltd.

4-2 When mounting a module to the circuit, do not apply excessive stress to the terminal leads or the fin. In particular, if there are some foreign objects between the module and the heat sink, or if there are some burrs or rising on the surface of the heat sink, it may happen that the substrate of the module will crack or break due to excessive stress from screwing the module on to the heat sink. Therefore, the surface of the heat sink in contact with the module must be as flat as possible.
When screwing a module to the heat sink, torque screw is recommended as 5 to 6kg-cm when using ϕ3mm screws.

4-3 For soldering, the major precautions are as follows:
1) Flux;
Roles of flux are to remove oxidized layer on the object, and prevent from oxidation during heating or lowering surface tension on the objects. Rosin flux, which is less corrosional and highly insulative, is recommended.
2) Soldering temperature;
The temperature of the lead soldering should be lower than 260°C and shorter than 10 seconds, or lower than 350°C and shorter than 3 seconds.
3) Cleaning after soldering;
The recommended solvent for cleaning the residual flux is the Ethyl Alcohol. Trichlene type solvents should not be used.

4-4 When the module is screwed after soldering the terminal leads to the circuit board, excessive stress is applied to the leads. Therefore, please solder the terminal leads to the circuit board after screwing the module to the heat sink.

4-5 If the module falls onto a hard surface, it will be damaged by mechanical shock and can no longer be used.

4-6 To obtain good stability and electrical performances, it is necessary to take precausions concerning the earth potential of the module. As the fin is the ground terminal, the fin should be connected to the ground of the set completly in RF condition.

4-7 The values of input VSWR and output VSWR of the module indicated in the specification sheet are guaranteed when the input and output leads are straight and these leads are connected to the load 50Ω within 10mm length. If the device is mounted under different conditions from these mentioneda above, the performances, such as output power and efficiency, may be degraded due to the impedance mismatch. In order to reform such an impedance mismatch, please set the additional matching circuits to get good impedance matching.

5. VOLTAGE SUPPLY

The modules have 2 or 3 terminals for DC power supply. If these terminals are combined without RFC (Radio Frequency Choke), or if each terminal is not bypassed with the condenser, parasitic oscillation occasionally may occured. Therefore, the DC Power Supply Terminals should be combined with RFC, and each terminal bypassed with the condensers (10μF and 4700pF in Parallel).

The first stage transistor of the module even for FM is operated in class AB. When excessively high voltage is applied to the first stage DC Power Supply Terminal, the first stage transistor may be destroyed due to current runaway. Therefore, the first stage supply voltage must be controlled, not exceeding 17 volts DC.

6. GUARANTEED CHARACTERISTICS

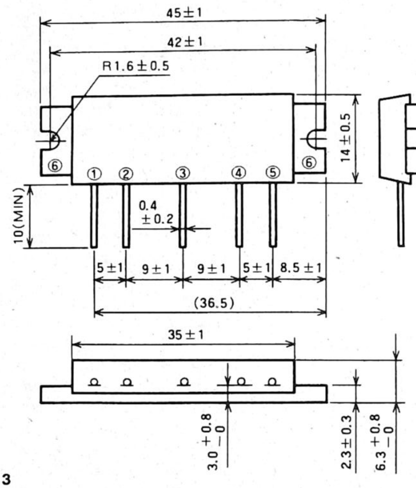
All the graphic characteristics illustrated in this catalog are typical examples. The characteristics of individual devices as specified in the tables of absolute maximum ratings and electrical characteristics are guaranteed under the specified conditions.

M57783L

135~160MHz, 7.5V, 7W, FM PORTABLE RADIO

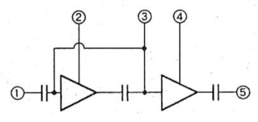
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		9	V
V_{BB}	Supply voltage		6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	100	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

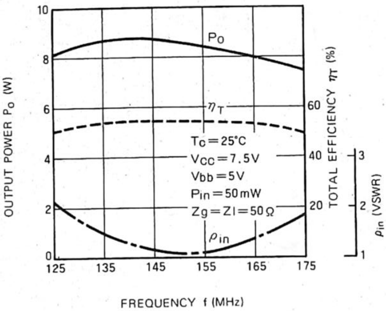
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 50mW, V_{BB} = 5V, V_{CC} = 7.5V, $Z_G = Z_L = 50\ \Omega$	135	160	MHz
Po	Output power		7		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 13V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

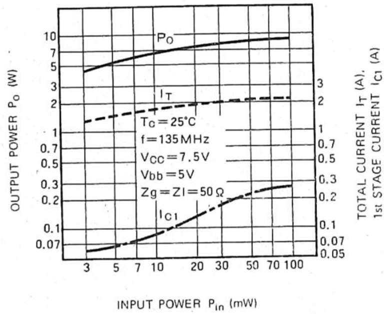
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

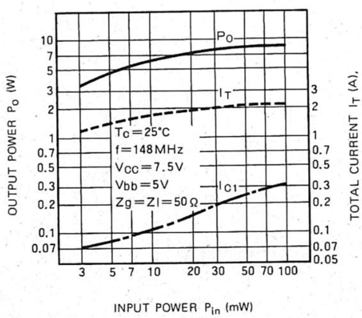
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



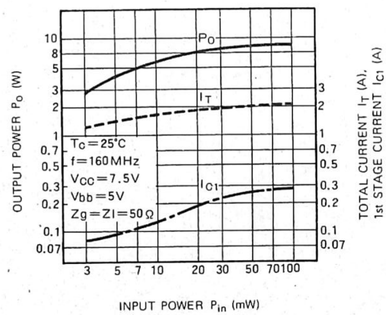
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



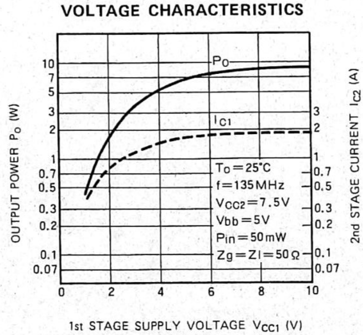
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



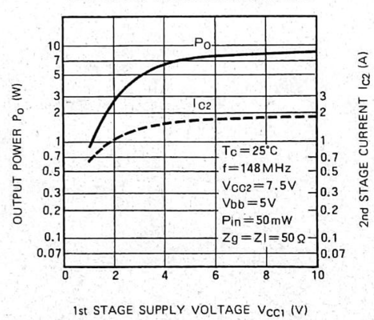
OUTPUT POWER, TOTAL CURRENT 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



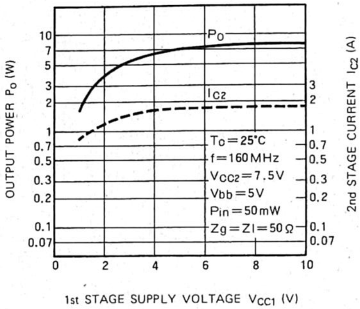
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



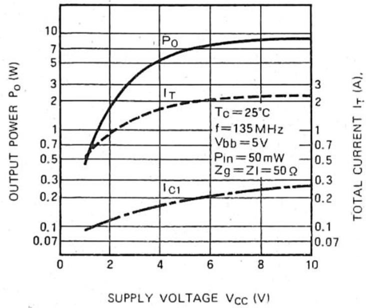
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



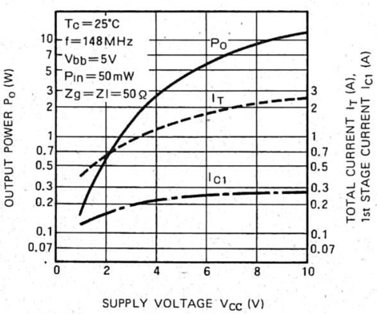
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



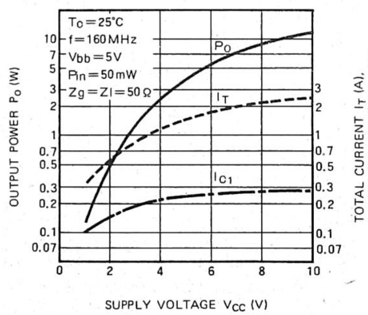
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



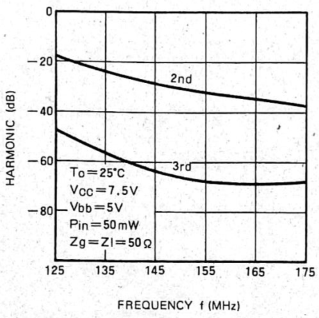
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER, TOTAL CURRENT 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



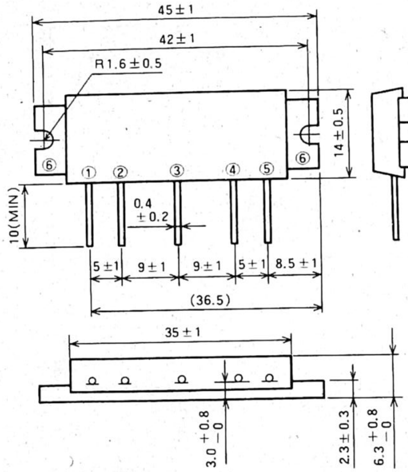
MITSUBISHI ELECTRIC

M57783H

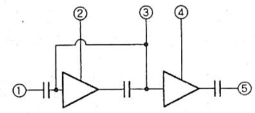
150~175MHz, 7.5V, 7W, FM PORTABLE RADIO

OUTLINE DRAWING

Dimensions in mm



BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		9	V
V_{BB}	Supply voltage		6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	100	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

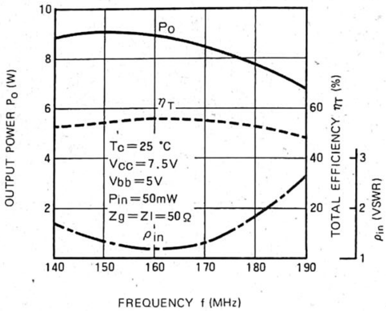
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 50mW, V_{BB} = 5V, V_{CC} = 7.5V, $Z_G = Z_L = 50\ \Omega$	150	175	MHz
Po	Output power		7		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 13V, V_{BB} = 5V, Po = 7W (P_{in} : controlled), Load VSWR=20:1 (All phase), 2sec., Z_G = 50 Ω	No degradation		−

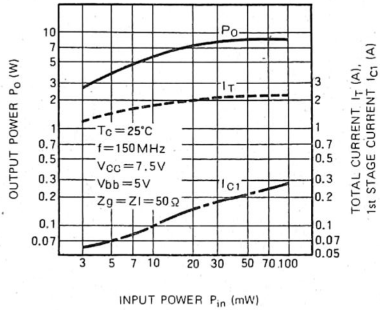
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

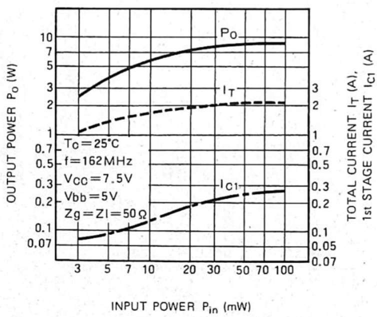
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



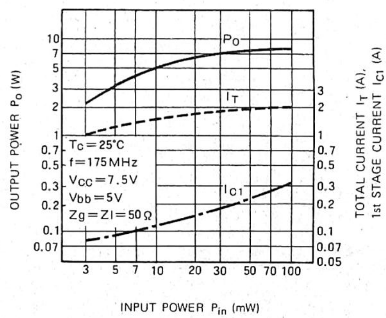
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



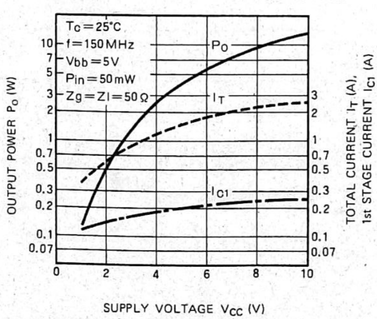
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



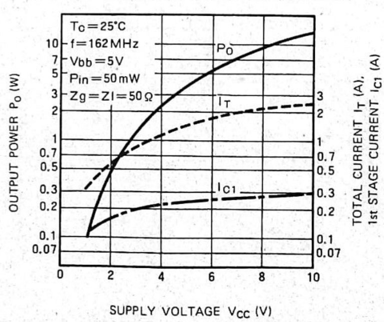
OUTPUT POWER, TOTAL CURRENT 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



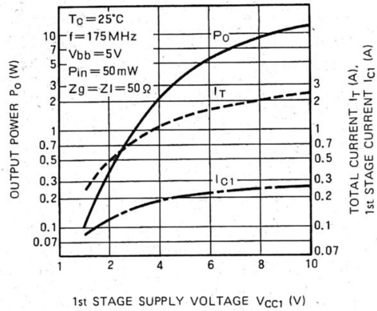
OUTPUT POWER, TOTAL CURRENT 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



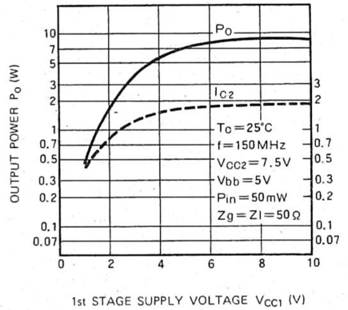
OUTPUT POWER TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



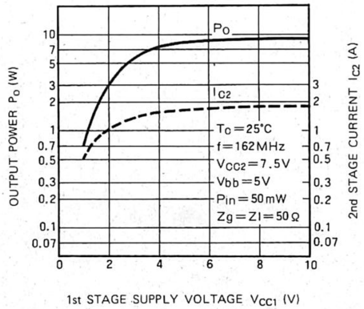
OUTPUT POWER TOTAL CURRENT 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



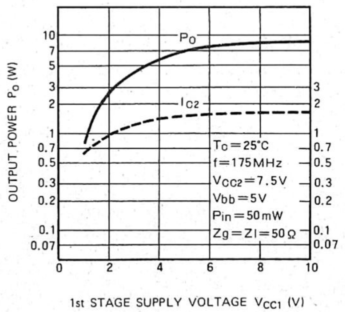
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



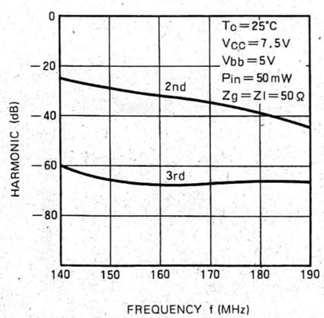
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



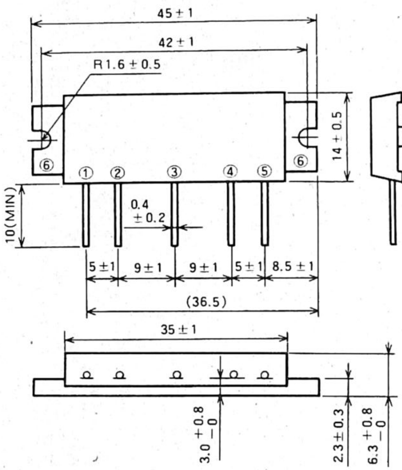
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



M57786UL

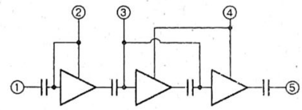
360~380MHz, 7.2V, 6W, FM PORTABLE RADIO

OUTLINE DRAWING Dimensions in mm



H12

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leq 5V$	10	V
V_{BB}		$V_{CC} \leq 7.2V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	100	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 50mW$ $V_{BB} = 5V$ $V_{CC} = 7.2V$ $Z_G = Z_L = 50\ \Omega$	360	380	MHz
Po	Output power		6		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC} = 7.2V$, $V_{BB} = 5V$ Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

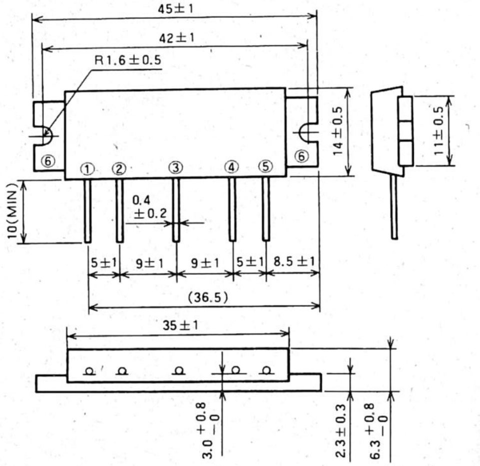
MITSUBISHI ELECTRIC

M57786L

400~430MHz, 7.2V, 7W, FM PORTABLE RADIO

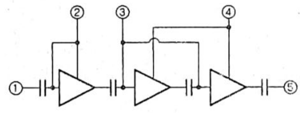
OUTLINE DRAWING

Dimensions in mm



H12

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④Vcc2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	10	V
V_{BB}		$V_{CC} \leqq 7.2V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	100	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

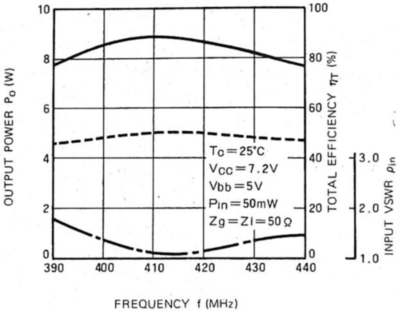
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 50mW V_{BB} = 5V V_{CC} = 7.2V $Z_G = Z_L = 50\,\Omega$	400	430	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 7.2V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

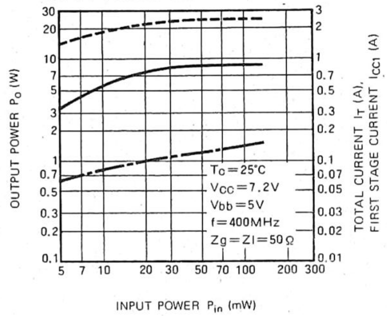
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

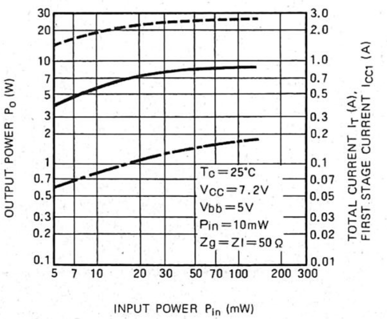
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



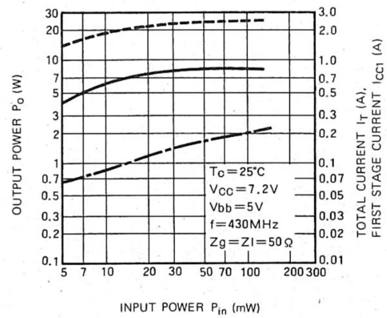
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



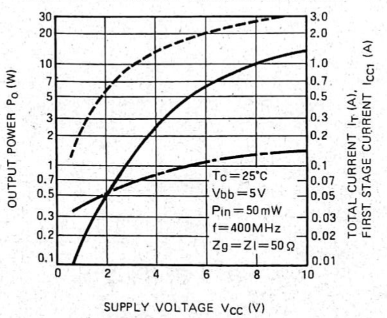
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



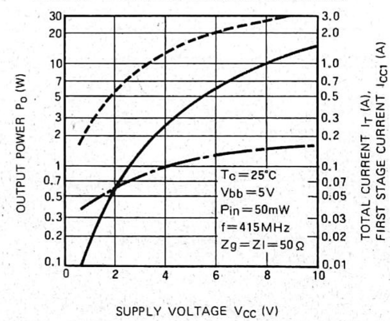
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



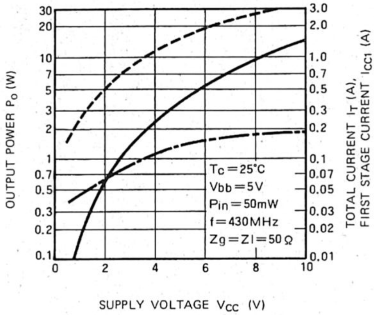
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



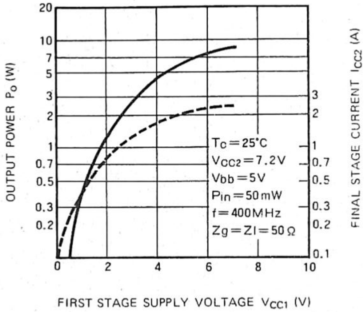
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



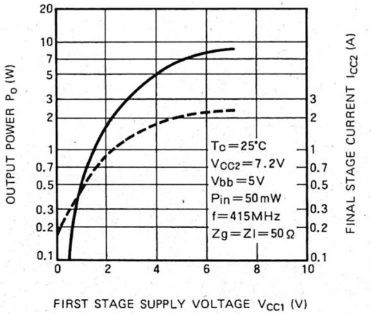
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



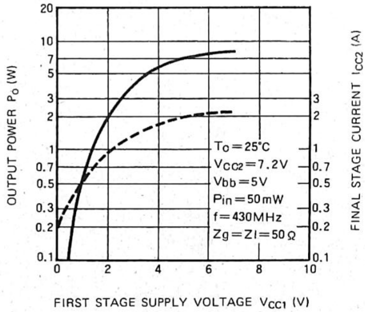
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHRACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

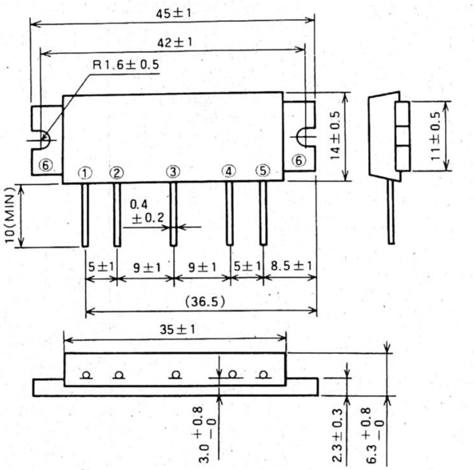


M57786M

430~470MHz, 7.2V, 7W, FM PORTABLE RADIO

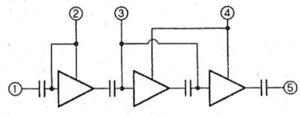
OUTLINE DRAWING

Dimensions in mm



H12

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	10	V
V_{BB}		$V_{CC} \leqq 7.2V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	100	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

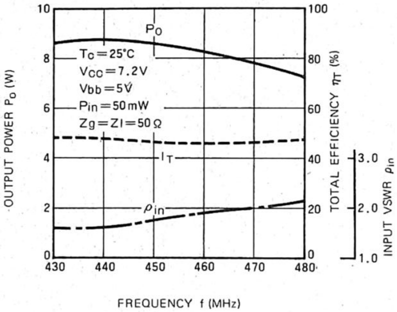
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 50mW V_{BB} = 5V V_{CC} = 7.2V $Z_G = Z_L = 50\ \Omega$	430	470	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 7.2V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

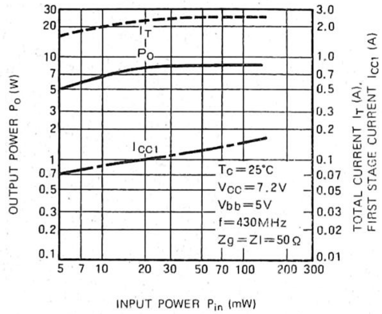
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

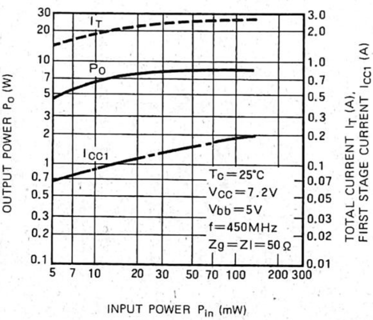
OUTPUT POWER, TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY CHARACTERISTICS



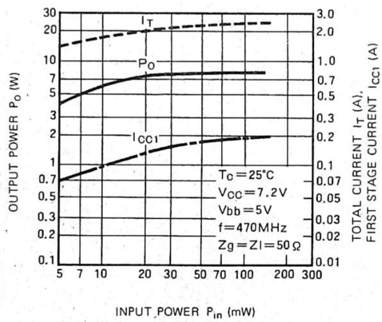
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



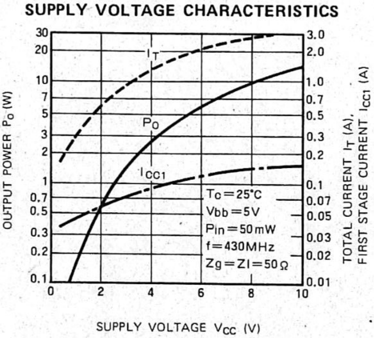
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



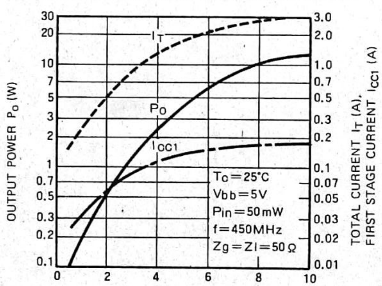
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



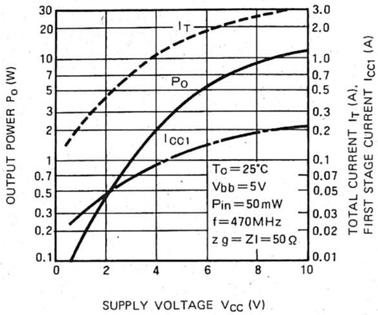
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



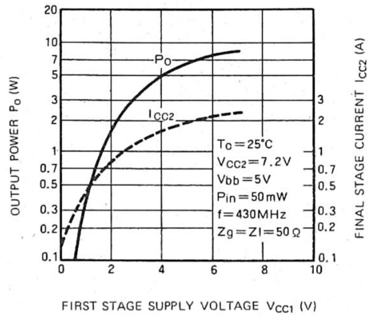
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



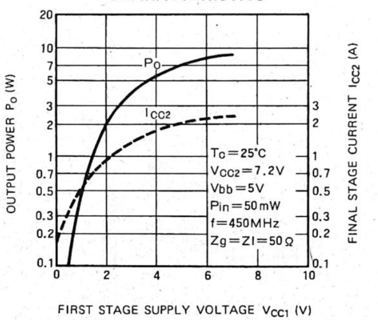
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



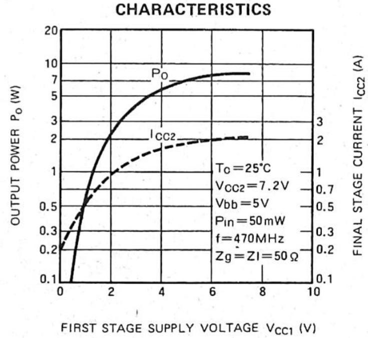
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

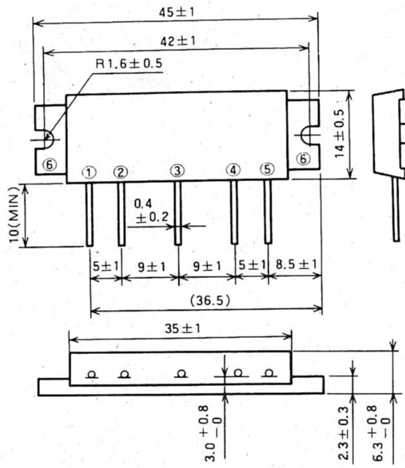


M57786H

470~512MHz, 7.2V, 7W, FM PORTABLE RADIO

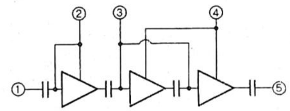
OUTLINE DRAWING

Dimensions in mm



H12

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leq 5V$	10	V
V_{BB}		$V_{CC} \leq 7.2V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	100	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		− 30~110	℃
T_{stg}	Storage temperature		− 40~110	℃

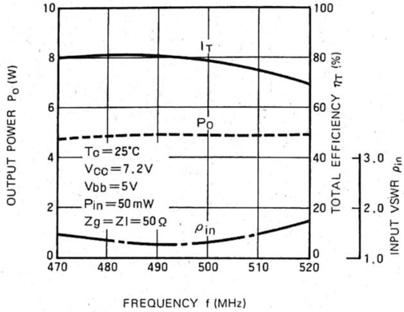
ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 50mW V_{BB} = 5V V_{CC} = 7.2V $Z_G = Z_L = 50\ \Omega$	470	512	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			− 25	dB
3fo	3rd. harmonic			− 30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 7.2V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

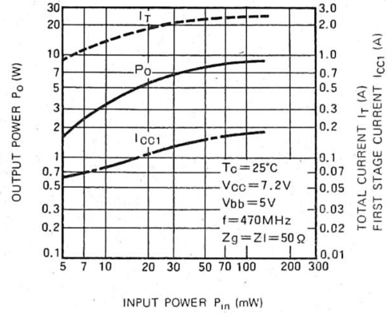
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

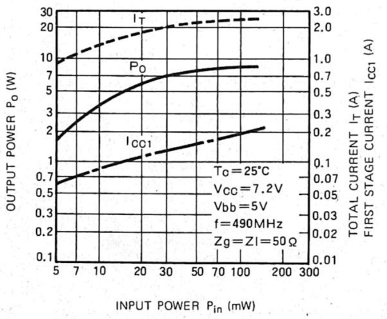
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



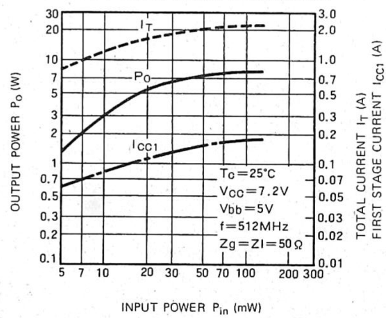
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



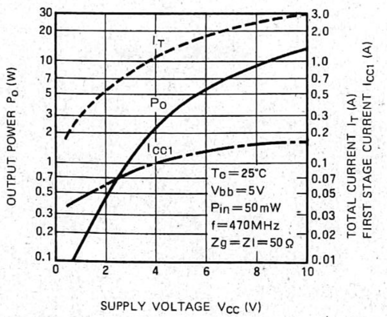
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



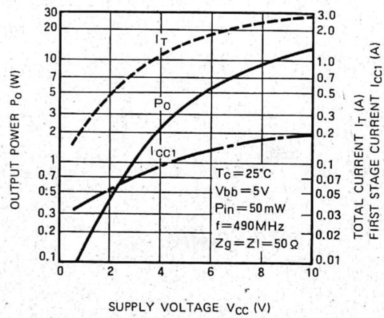
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



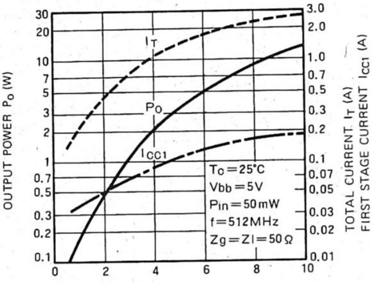
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



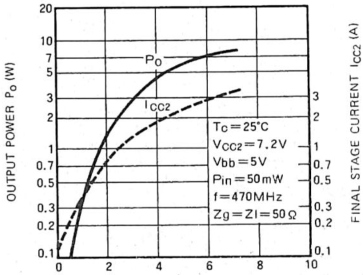
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



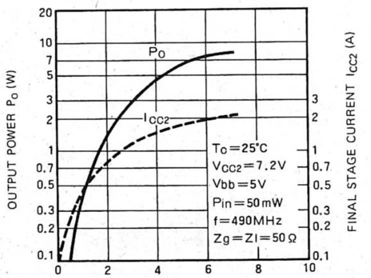
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



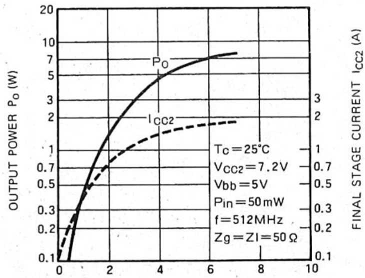
OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FINAL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

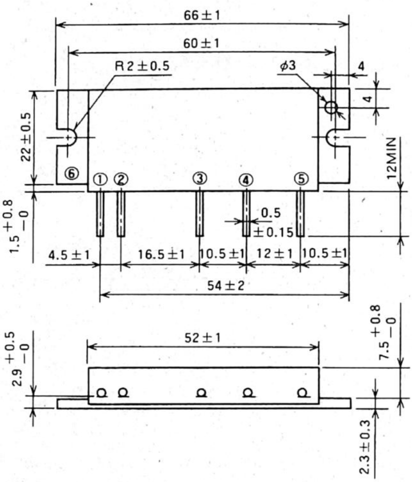


M57788L

400~430MHz, 12.5V, 40W, FM MOBILE RADIO

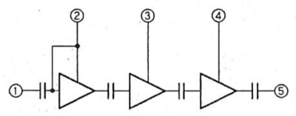
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

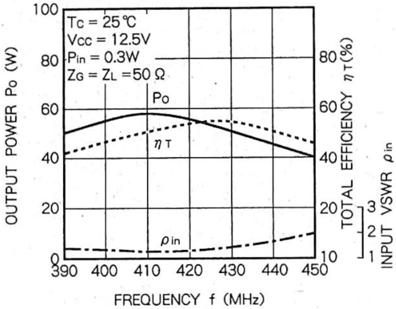
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
$V_{CC2,3}$			17	V
I_{CC}	Total current		12	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	50	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

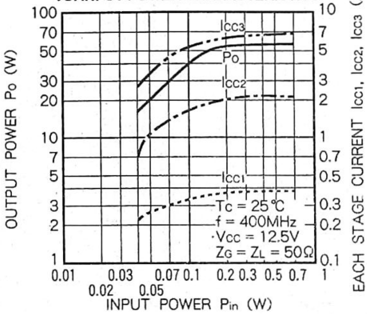
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	400	430	MHz
P_o	Output power		40		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_o = 40W (P_{in} : controlled) Load VSWR=8.8:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

TYPICAL PERFORMANCE DATA

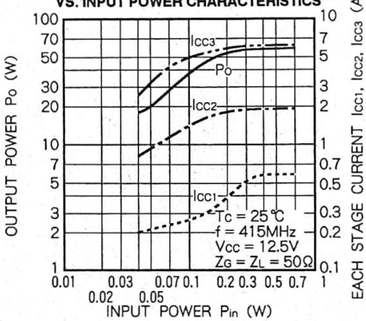
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



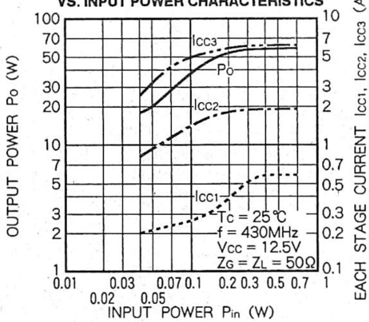
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



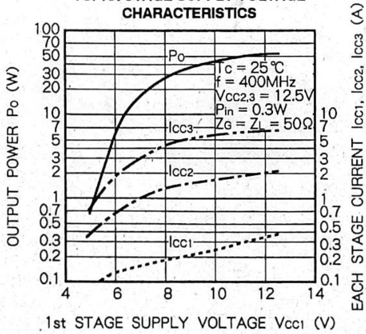
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



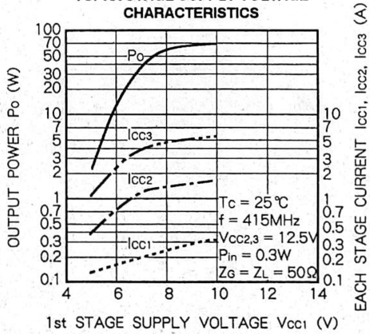
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



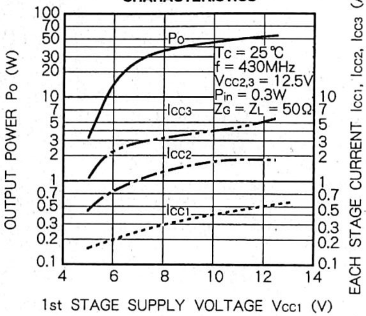
OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



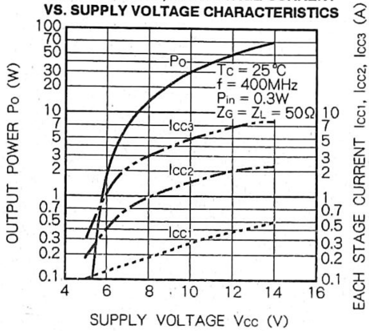
OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



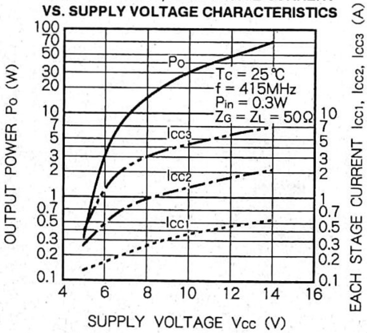
OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



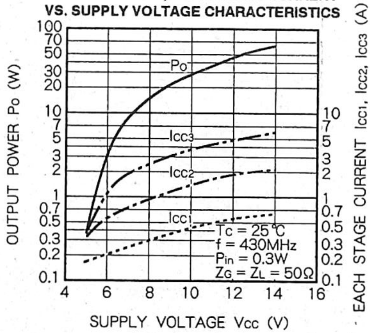
OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

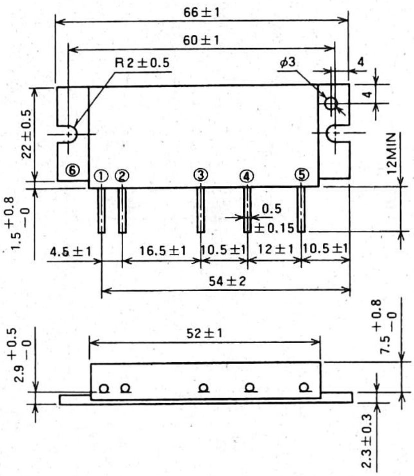


M57788M

430~450MHz, 12.5V, 40W, FM MOBILE RADIO

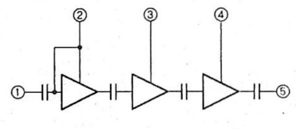
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		16	V
$V_{CC2,3}$			17	V
I_{CC}	Total current		12	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	50	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

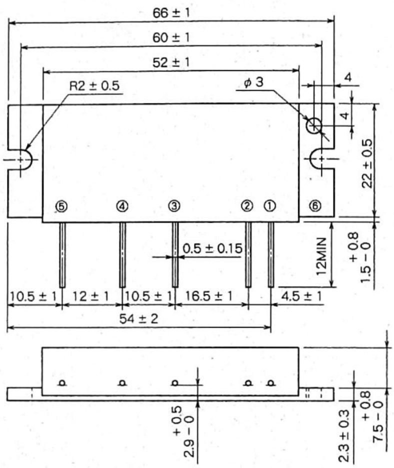
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range		430	450	MHz
Po	Output power	P_{in} = 0.4W, V_{CC} = 12.5V, $Z_G = Z_L = 50\ \Omega$	40		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, Po = 40W (P_{in} : controlled), Load VSWR=8.8:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M57788MR

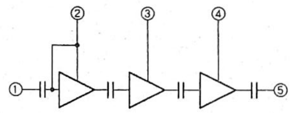
430~450MHz, 13.5V, 45W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		12	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	50	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.4W, V_{CC} = 13.5V, $Z_G = Z_L = 50\ \Omega$	430	450	MHz
Po	Output power		45		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, Po = 40W (P_{in} : controlled) Load VSWR=8.8:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

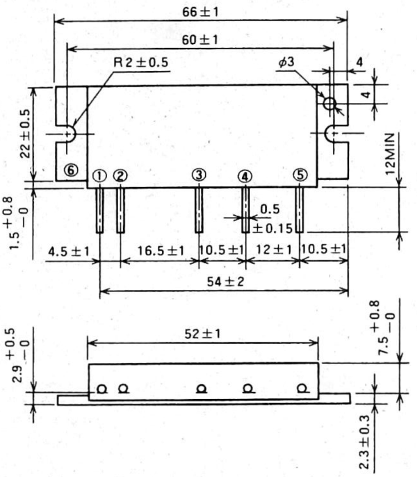
MITSUBISHI ELECTRIC

M57788H

450~470MHz, 12.5V, 40W, FM MOBILE RADIO

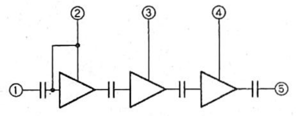
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
$V_{CC2,3}$			17	V
I_{CC}	Total current		12	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	50	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

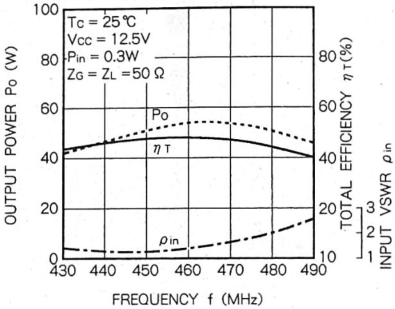
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	450	470	MHz
Po	Output power		40		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, Po = 40W (P_{in} : controlled) Load VSWR=8.8:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

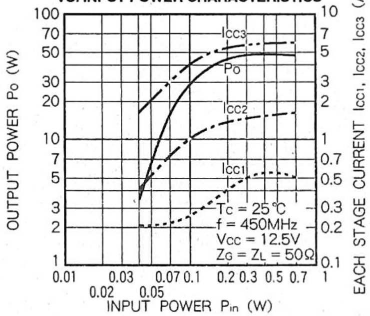
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

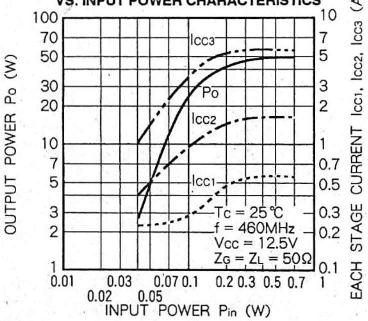
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



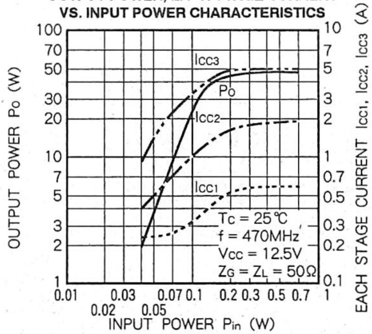
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



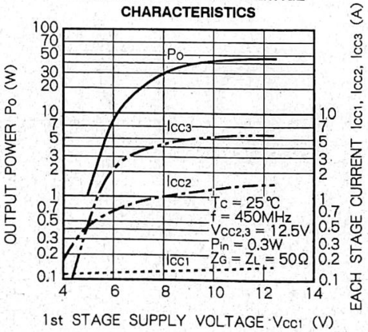
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



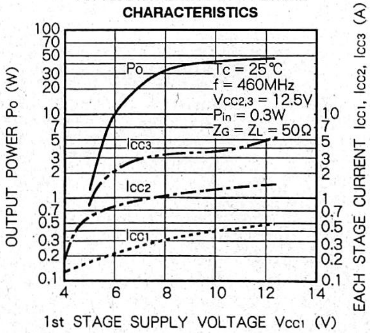
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

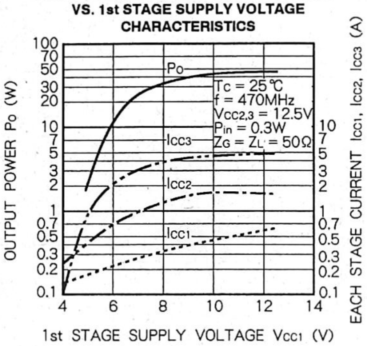


OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

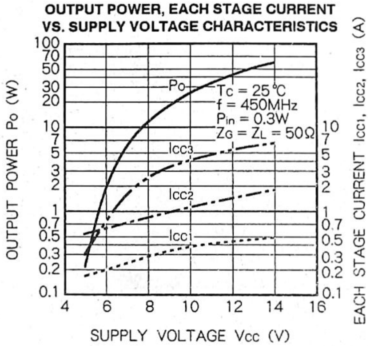


MITSUBISHI ELECTRIC

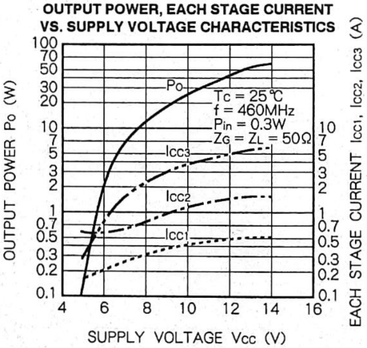
OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



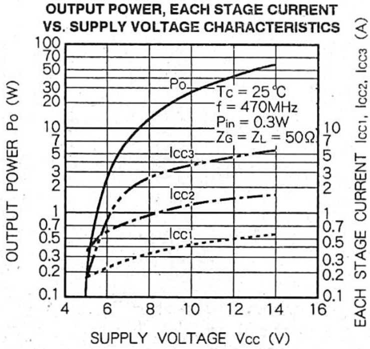
OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

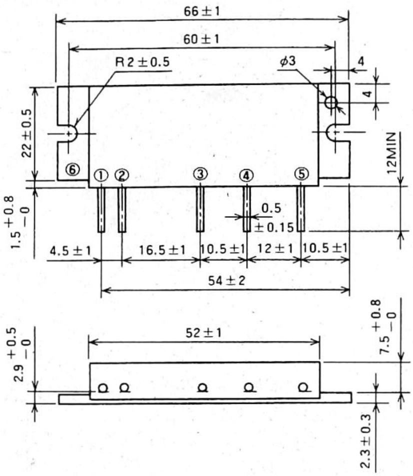


M57788UH

470~490MHz, 12.5V, 40W, FM MOBILE RADIO

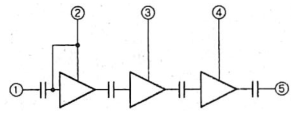
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		16	V
$V_{CC2,3}$			17	V
Icc	Total current		12	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	50	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

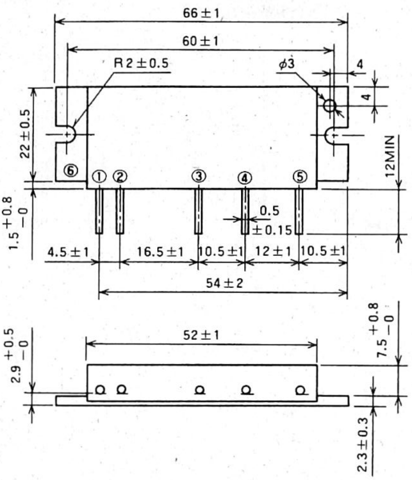
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.3W Vcc = 12.5V $Z_G = Z_L = 50\ \Omega$	470	490	MHz
Po	Output power		40		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 40W (P_{in} : controlled) Load VSWR=8.8:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M57788SH

490~512MHz, 12.5V, 40W, FM MOBILE RADIO

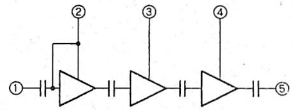
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
$V_{CC2,3}$			17	V
I_{CC}	Total current		12	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	50	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	490	512	MHz
P_O	Output power		40		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V, P_O = 40W (P_{in} : controlled) Load VSWR=8.8:1 (All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

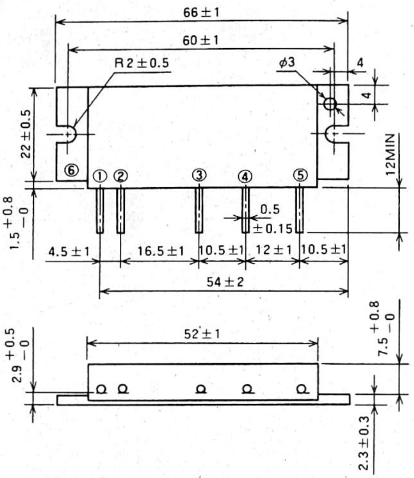
MITSUBISHI ELECTRIC

M57789

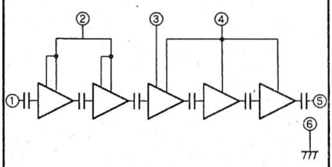
890~915MHz, 12.5V, 12W, FM MOBILE RADIO

OUTLINE DRAWING

Dimensions in mm



BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC supply		13	V
V_{BB}	Base bias		9	V
V_{CC2}	2nd. DC supply		17	V
Icc	Total current	$Z_G = Z_L = 50\ \Omega$	5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 12.5V$	10	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

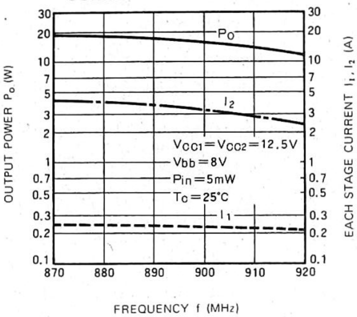
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$V_{CC1} = V_{CC2} = 12.5$, $V_{BB} = 8V$ $P_{in} = 5mW$ $Z_G = Z_L = 50\ \Omega$	890	915	MHz
Po	Output power		12		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC1}=12.5V, V_{CC2}=15.2V, V_{BB}=8V Po = 12W(P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

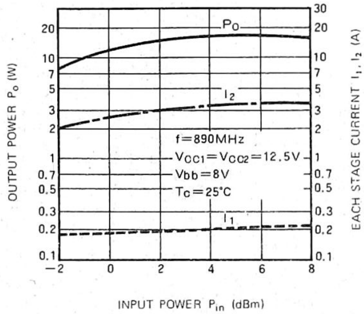
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

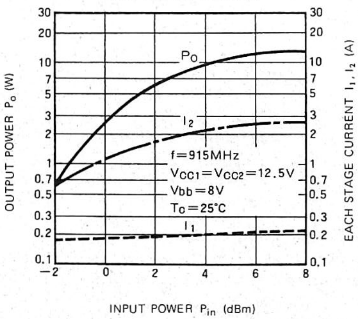
OUTPUT POWER, EACH STAGE CURRENT VS. FREQUENCY



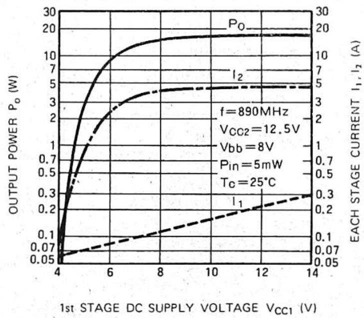
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



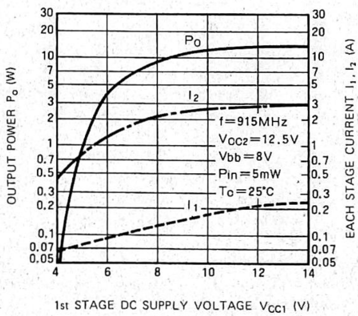
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE

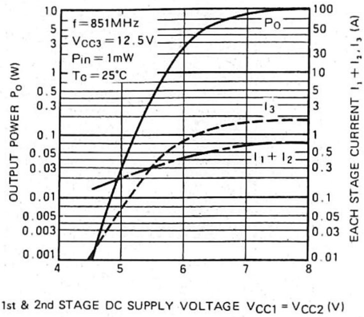


Table 1: The conditions at standard operation

Stage	Vcc (V)	IT (mA)	Pin (mW)	Po (mW)
1st	12.5	60	5	30
2nd	12.5	170	30	400
3rd	12.5	280	400	1300
4th	12.5	770	1300	4800
5th	12.5	1920	4800	12000

DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to the following consideration when designing a heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistances between junction of incorporated transistors and case are shown in the followings.

a) First stage transistor

$R_{th(j-c)1} = 20°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 17.5°C/W$ (Typ.)

c) Third stage transistor

$R_{th(j-c)3} = 15°C/W$ (Typ.)

d) Fourth stage transistor

$R_{th(j-c)4} = 7.5°C/W$ (Typ.)

e) Final stage transistor

$R_{th(j-c)5} = 3.75°C/W$ (Typ.)

(2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

$P_O = 12W$, $V_{CC1} = V_{CC2} = V_{CC3} = 12.5V$, $P_{in} = 5mW$, $\eta_T = 30\%$ (minimum ratings),

$I_1 = 0.23A$ (Total current from 1st stage to 2nd stage)

$I_2 = 2.97A$ (Total current from 3rd stage to 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

- Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C^{(\text{Note 1})}$$
$$= (12.5 \times 0.06 - 0.02 + 0.005) \times 20 + T_C$$
$$= 14.6 + T_C \ (°C)$$

Note 1: Case temperature of device

- Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC1} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$$
$$= (12.5 \times 0.17 - 0.4 + 0.03) \times 17.5 + T_C$$
$$= 30.7 + T_C \ (°C)$$

- Junction temperature of the third stage transistor

$$T_{j3} = (V_{CC2} \times I_{T3} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_C$$
$$= (12.5 \times 0.28 - 1.3 + 0.4) \times 15 + T_C$$
$$= 39.0 + T_C \ (°C)$$

- Junction temperature of the fourth stage transistor

$$T_{j4} = (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_C$$
$$= (12.5 \times 0.77 - 4.8 + 1.3) \times 7.5 + T_C$$
$$= 45.9 + T_C \ (°C)$$

- Junction temperature of the final stage transistor

$$T_{j5} = (V_{CC3} \times I_{T5} - P_{O5} + P_{O4}) \times R_{th(j-c)5} + T_C$$
$$= (12.5 \times 1.92 - 12 + 4.8) \times 3.75 + T_C$$
$$= 63.0 + T_C \ (°C)$$

2. Heating sink design

In thermal design of heat sink, keep the case temperature below 90°C at output power $P_O = 12W$ and ambient temperatue = 60°C.

The thermal resistance $R_{th(c-a)}$ (Note 2) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_P + P_{in}} = \frac{90 - 60}{(12/0.3 - 12 + 0.001)}$$
$$= 1.00 \ (°C/W)$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

$T_{j1} = 105°C$, $T_{j2} = 121°C$, $T_{j3} = 129°C$, $T_{j4} = 136°C$, $T_{j5} = 153°C$ at $T_a = 60°C$, $T_C = 90°C$.

Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become;

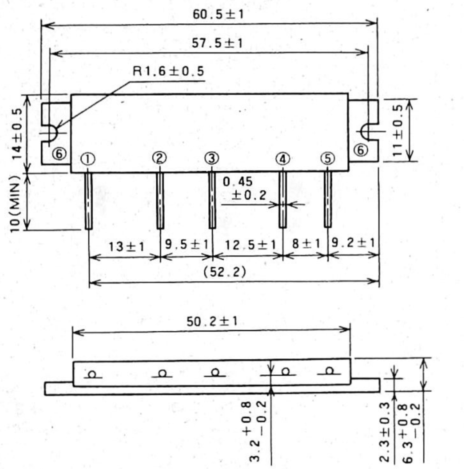
$T_{j1} = 75°C$, $T_{j2} = 91°C$, $T_{j3} = 99°C$, $T_{j4} = 106°C$, $T_{j5} = 123°C$.

As the maximum junction temperature of these incorporated transistors T_{jmax} are 153°C, application under fully derated condition is ensured.

M57791

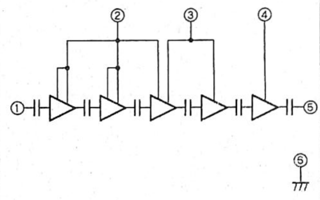
890~915MHz, 12.5V, 7W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

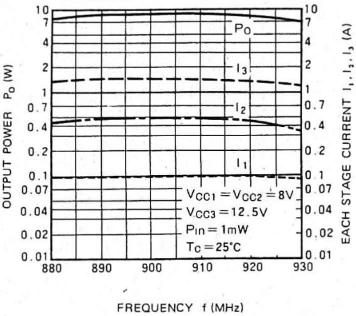
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC supply		9	V
V_{CC2}	2nd. DC supply		9	V
V_{CC3}	3rd. DC supply		17	V
I_{CC}	Total current	$Z_G = Z_L = 50\ \Omega$	4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 8V$	7	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

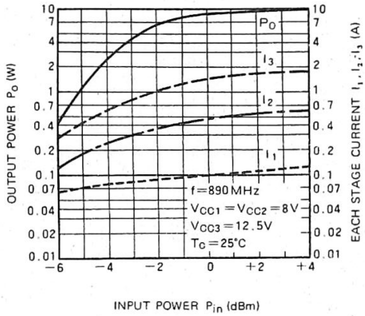
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$ $P_{in} = 1mW$ $Z_G = Z_L = 50\ \Omega$	890	915	MHz
Po	Output power		7		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 15.2V$ Po = 7W (P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

TYPICAL PERFORMANCE DATA

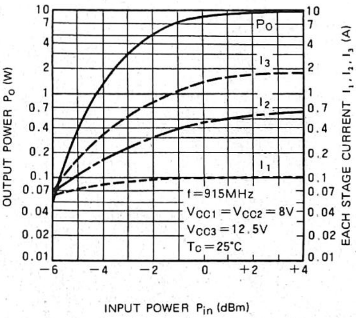
OUTPUT POWER, EACH STAGE CURRENT VS. FREQUENCY



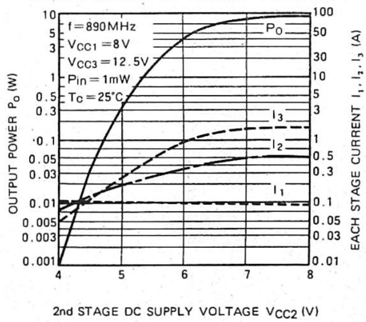
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



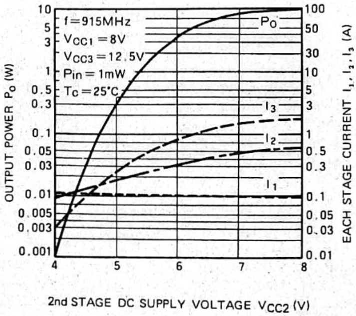
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



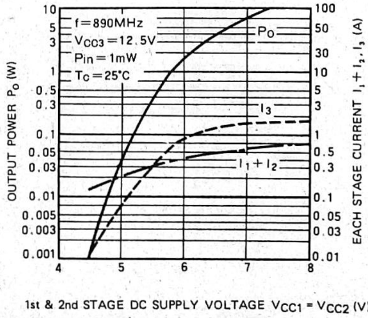
OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE

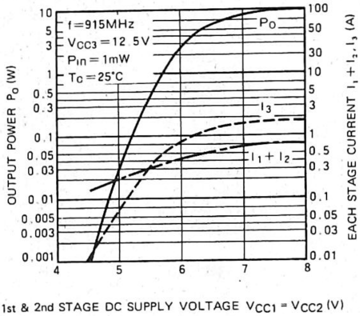


Table 1: The conditions at standard operation

Stage	Vcc (V)	IT (mA)	Pin (mW)	Po (mW)
1st	8	45	1	20
2nd	8	80	20	200
3rd	8	160	200	500
4th	8	496	500	2000
5th	12.5	1100	2000	7000

DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to the following consideration when designing a heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistances between junction of incorporated transistors and case are shown in the followings.

a) First stage transistor
$R_{th(j-c)1} = 20°C/W$ (Typ.)

b) Second stage transistor
$R_{th(j-c)2} = 17.5°C/W$ (Typ.)

c) Third stage transistor
$R_{th(j-c)3} = 16°C/W$ (Typ.)

d) Fourth stage transistor
$R_{th(j-c)4} = 9°C/W$ (Typ.)

e) Final stage transistor
$R_{th(j-c)5} = 6.5°C/W$ (Typ.)

(2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

$P_O = 7W$, $V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$, $P_{in} = 1mW$, $\eta_T = 35\%$ (minimum ratings),

$I_{1+2} = 0.781A$ (Total current from 1st stage to 4th stage)

$I_3 = 1.1A$ (Current of 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

- Junction temperature of the first stage transistor

$T_{j1} = (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C$ (Note 1)
$= (8 \times 0.045 - 0.02 + 0.001) \times 20 + T_C$
$= 6.8 + T_C$ (°C)

Note 1: Case temperature of device

- Junction temperature of the second stage transistor

$T_{j2} = (V_{CC1} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$
$= (8 \times 0.08 - 0.2 + 0.02) \times 17.5 + T_C$
$= 8.1 + T_C$ (°C)

- Junction temperature of the third stage transistor

$T_{j3} = (V_{CC2} \times I_{T3} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_C$
$= (8 \times 0.16 - 0.5 + 0.2) \times 16 + T_C$
$= 15.7 + T_C$ (°C)

- Junction temperature of the fourth stage transistor

$T_{j4} = (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_C$
$= (8 \times 0.496 - 2 + 0.5) \times 9 + T_C$
$= 22.2 + T_C$ (°C)

- Junction temperature of the final stage transistor

$T_{j5} = (V_{CC3} \times I_{T5} - P_O + P_{O4}) \times R_{th(j-c)5} + T_C$
$= (12.5 \times 1.1 - 7 + 2) \times 6.5 + T_C$
$= 56.9 + T_C$ (°C)

2. Heat sink design

In thermal design of heat sink, keep the case temperature below 90°C at output power P_O = 7W and ambient temperature = 60°C.

The thermal resistance $R_{th(c-a)}$ (Note 2) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.35 - 7 + 0.001)}$$
$$= 2.31\ (°C/W)$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

$T_{j1} = 97°C$, $T_{j2} = 99°C$, $T_{j3} = 106°C$, $T_{j4} = 113°C$, $T_{j5} = 147°C$ at $T_a = 60°C$, $T_C = 90°C$.

Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become;

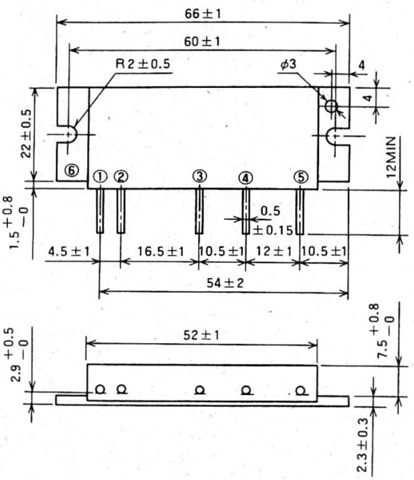
$T_{j1} = 67°C$, $T_{j2} = 69°C$ $T_{j3} = 76°C$, $T_{j4} = 76°C$, $T_{j5} = 117°C$

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57792

806~870MHz, 13.5V, 20W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC supply		14	V
V_{CC2}	2nd. DC supply		17	V
V_{CC3}	3rd. DC supply		17	V
I_{CC}	Total current	$Z_G = Z_L = 50\ \Omega$	7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 12.5V$	0.8	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	30	W
$T_{C(OP)}$	Operation case temperature	$Z_G = Z_L = 50\ \Omega$	−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

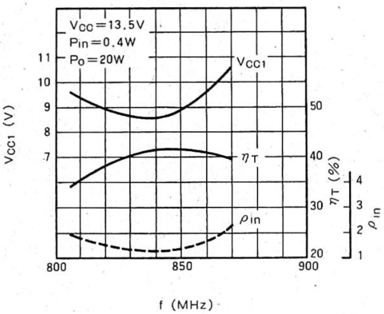
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$V_{CC1} = V_{CC2} = V_{CC3} = 13.5V$ $P_{in} = 0.4W$ $Z_G = Z_L = 50\ \Omega$	806	870	MHz
Po	Output power		20		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC1} = 13.5V$, $V_{CC2} = V_{CC3} = 15.5V$ $P_o = 20W$ (P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

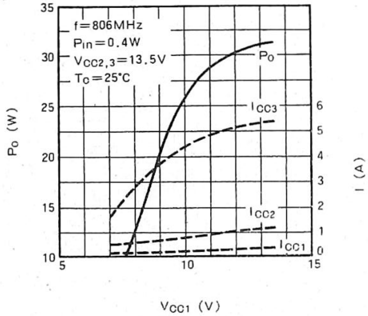
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

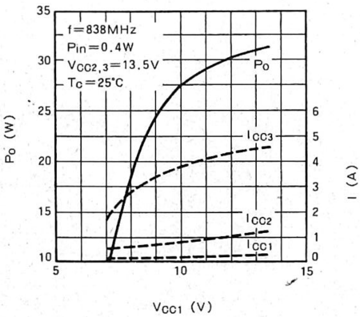
V_{CC1}, η_T, ρ_{in} CHARACTERISTIC (P_O 20W SET)



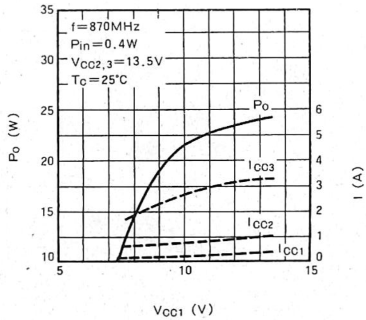
P_O, I VS. V_{CC1} CHARACTERISTIC



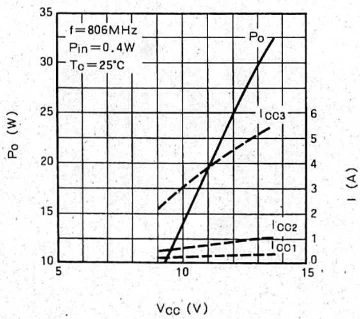
P_O, I VS. V_{CC1} CHARACTERISTIC



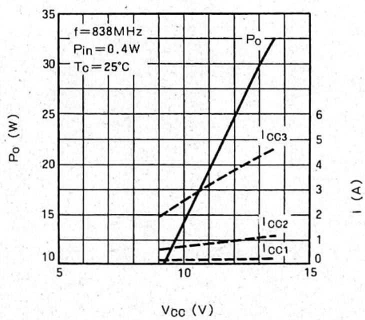
P_O, I VS. V_{CC1} CHARACTERISTIC



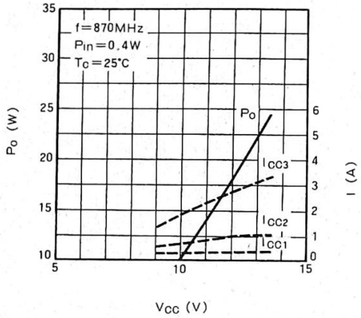
P_O, I VS. V_{CC} CHARACTERISTIC



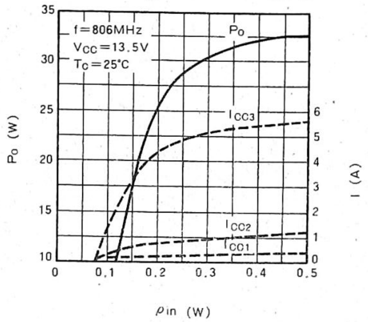
P_O, I VS. V_{CC} CHARACTERISTIC



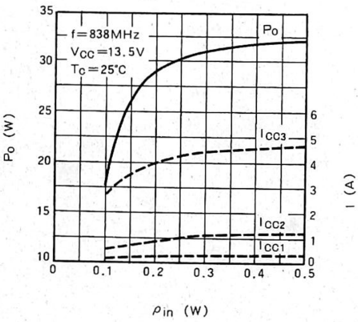
P_o, I VS. V_{CC} CHARACTERISTIC



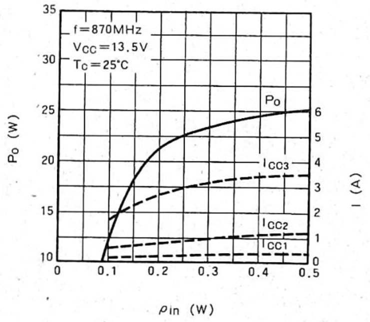
P_o, I VS. P_{in} CHARACTERISTIC



P_o, I VS. P_{in} CHARACTERISTIC



P_o, I VS. P_{in} CHARACTERISTIC



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operaton.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 15°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 3°C/W$ (Typ.)

c) Final stage transistor

$R_{th(j-c)3} = 1.87°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

- Conditions for standard operation.
  $P_O = 20W$, $V_{CC} = 13.5V$, $P_{in} = 0.4W$, $\eta_T = 30\%$ (minimum rating), P_{O1} (Note 1) $= 3W$, P_{O2} (2) $= 10W$, $I_T = 4.9A$ (I_{T1} (3) $= 0.4A$, I_{T2} (4) $= 1.4A$, I_{T3} (5) $= 3.1A$)
  Note 1: Output power of the first stage transistor
  Note 2: Output power of the second stage transistor
  Note 3: Circuit current of the first stage transistor
  Note 4: Circuit current of the second stage transistor
  Note 5: Circuit current of the final stage transisotr
- Junction temperature of the first stage transistor
  $T_{j1} = (V_{CC} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C$ (6)
  $= (13.5 \times 0.4 - 3 + 0.4) \times 15 + T_C$
  $= 42 + T_C$ (°C)
  Note 6: Package temperature of device
- Junction temperature of the second stage transistor
  $T_{j2} = V_{CC} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$
  $= (13.5 \times 1.4 - 10 + 3) \times 3 + T_C$
  $= 35.7 + T_C$ (°C)
- Junction temperature of the final stage transistor
  $T_{j3} = (V_{CC} \times I_{T3} - P_O + P_{O2}) \times R_{th(j-c)3} + T_C$
  $= (13.5 \times 3.1 - 20 + 10) \times 1.87 + T_C$
  $= 59.6 + T_C$ (°C)

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the output power of 20W below 90°C.

The thermal resistance $R_{th(c-a)}$ (7) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(20/0.3) - 20 + 0.4}$$

$= 0.637$ (°C/W)

Note 7: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device,

$T_{j1} = 132°C$, $T_{j2} = 125.7°C$, $T_{j3} = 149.6°C$ at $T_a = 60°C$, $T_C = 90°C$.

In the annual average of ambient temperature is 30°C,

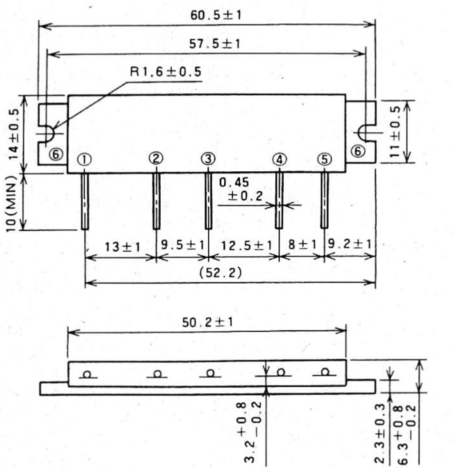
$T_{j1} = 102°C$, $T_{j2} = 95.7°C$, $T_{j3} = 119.6°C$.

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M57793

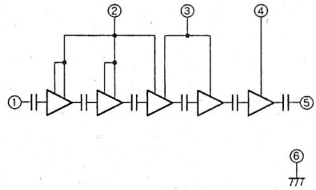
903~905MHz, 12.5V, 7W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

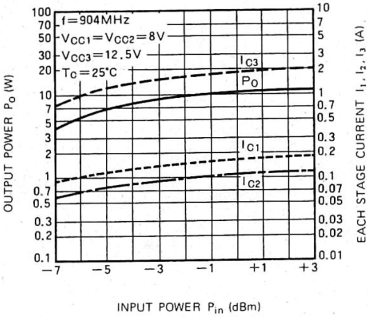
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. DC supply		9	V
V_{CC2}	2nd. DC supply		9	V
V_{CC3}	3rd. DC supply		17	V
I_{CC}	Total current	$Z_G = Z_L = 50\ \Omega$	4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leq 8V$	7	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		− 30~110	℃
T_{stg}	Storage temperature		− 40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

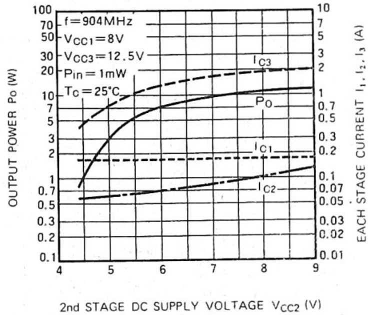
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$ $P_{in} = 1mW$ $Z_G = Z_L = 50\ \Omega$	903	905	MHz
Po	Output power		7		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			− 30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 15.2V$ Po = 7W (P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

TYPICAL PERFORMANCE DATA

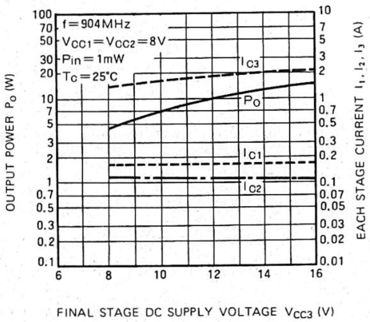
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. FINAL STAGE DC SUPPLY VOLTAGE



APC Method

For Automatic Power Control (APC), we recommend the method by V_{CC2} control.

Please regulate each stage supply voltage and input power as followings:

Symbol	Center value	Allowable changing value
P_{in}	1mW	0.7 ~ 3mW
V_{CC1}	8V	7 ~ 8.5V
V_{CC2}	3 ~ 8V	–
V_{CC3}	13.5V	12.5V ~ 13.8V

DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to the following consideration when designing a heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistances between junction of incorporated transistors and case are shown in the followings.

a) First stage transistor
$R_{th(j-c)1} = 20°C/W$ (Typ.)

b) Second stage transistor
$R_{th(j-c)2} = 17.5°C/W$ (Typ.)

c) Third stage transistor
$R_{th(j-c)3} = 16°C/W$ (Typ.)

d) Fourth stage transistor
$R_{th(j-c)4} = 9°C/W$ (Typ.)

e) Final stage transistor
$R_{th(j-c)5} = 6.5°C/W$ (Typ.)

(2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

P_O = 7W, V_{CC1} = V_{CC2} = 8V, V_{CC3} = 12.5V, P_{in} = 1mW, η_T = 35% (minimum ratings),

I_{1+2} = 0.781A (Total current from 1st stage to 4th stage)

I_3 = 1.43A (Current of 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C{}^{(Note\ 1)}$$
$$= (8 \times 0.05 - + 0.001) \times 20 + T_C$$
$$= 7.6 + T_C\ (°C)$$

Note 1: Case temperature of device

Junction temperature of the second stage transistor

$$T_{j2} = (V_{CC1} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$$
$$= (8 \times 0.09 - 0.2 + 0.02) \times 17.5 + T_C$$
$$= 9.5 + T_C\ (°C)$$

Junction temperature of the third stage transistor

$$T_{j3} = (V_{CC2} \times I_{Te} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_C$$
$$= (8 \times 0.12 - 0.5 + 0.2) \times 16 + T_C$$
$$= 11.6 + T_C\ (°C)$$

Junction temperature of the fourth stage transistor

$$T_{j4} = (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_C$$
$$= (12.5 \times 0.43 - 2 + 0.5) \times 9 + T_C$$
$$= 34.9 + T_C\ (°C)$$

Junction temperature of the final stage transistor

$$T_{j5} = (V_{CC3} \times I_{T5} - P_{O5} + P_{O4}) \times R_{th(j-c)5} + T_C$$
$$= (12.5 \times 1.0 - 7 + 2) \times 6.5 + T_C$$
$$= 48.8 + T_C\ (°C)$$

2. Heat sink design

In thermal design of heat sink, keep the case temperature below 90°C at output power P_O = 7W and ambient temperature = 60°C.

Table 1: The conditions at standard operation

Stage	V_{CC} (V)	I_T (mA)	P_{in} (mW)	P_o (mW)
1st	8	50	1	20
2nd	8	90	20	200
3rd	8	120	200	500
4th	8	430	500	2000
5th	12.5	1000	2000	7000

The thermal resistance $R_{th(c-a)}$ (Note 2) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.35 - 7 + 0.001)}$$
$$= 2.31(°C/W)$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

T_{j1} = 98°C, T_{j2} = 100°C, T_{j3} = 102°C, T_{j4} = 125°C, T_{j5} = 139°C at T_a = 60°C, T_C = 90°C.

Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become;

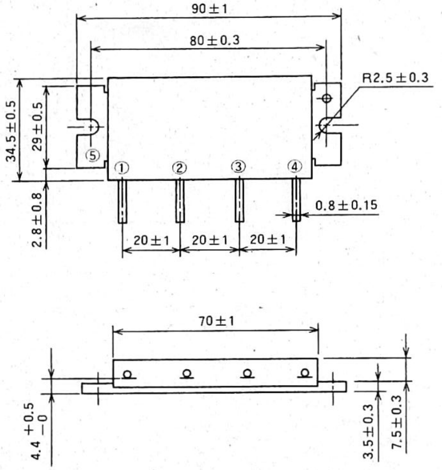
T_{j1} = 68°C, T_{j2} = 70°C, T_{j3} = 72°C, T_{j4} = 95°C, T_{j5} = 109°C

As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M67702

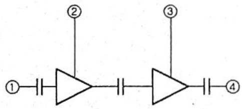
150~175MHz, 12.5V, 60W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H17

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		25	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	10	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	90	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 5W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\,\Omega$	150	175	MHz
P_o	Output power		60		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$ $P_o = 60W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\,\Omega$	No degradation		−

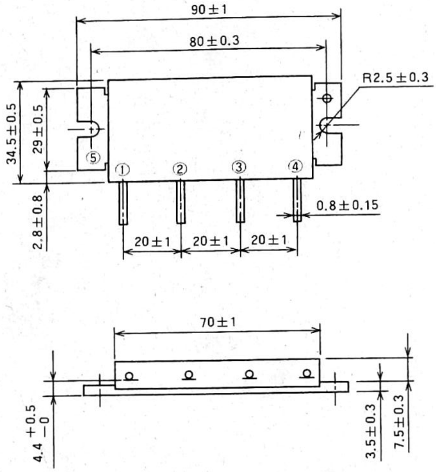
MITSUBISHI ELECTRIC

M67703M

430~450MHz, 12.5V, 45-50W, FM MOBILE RADIO

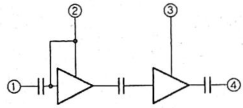
OUTLINE DRAWING

Dimensions in mm



H17

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④PO : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		25	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\Omega$	18	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\Omega$	80	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 10W Vcc = 12.5V $Z_G = Z_L = 50\Omega$	430	450	MHz
Po	Output power		50		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V Po = 50W (P_{in} : controlled) Load VSWR=8.8:1 (All phase), 2sec. $Z_G = 50\Omega$	No degradation		−

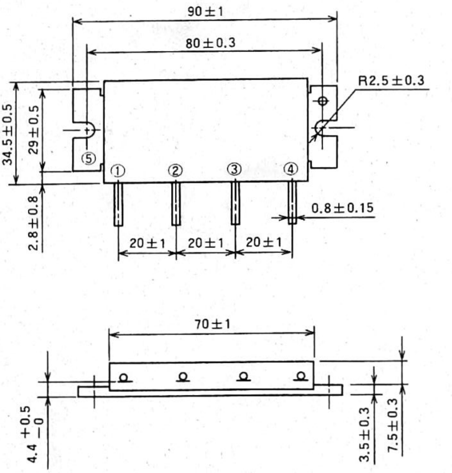
MITSUBISHI ELECTRIC

M67703H

450~470MHz, 12.5V, 45-50W, FM MOBILE RADIO

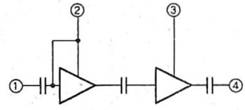
OUTLINE DRAWING

Dimensions in mm



H17

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		25	A
Pin(max)	Input power	ZG = ZL = 50 Ω	18	W
Po(max)	Output power	ZG = ZL = 50 Ω	80	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	Pin = 10W Vcc = 12.5V ZG = ZL = 50 Ω	450	470	MHz
Po	Output power		50		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V Po = 50W (Pin : controlled) Load VSWR=8.8:1(All phase), 2sec. ZG = 50 Ω	No degradation		−

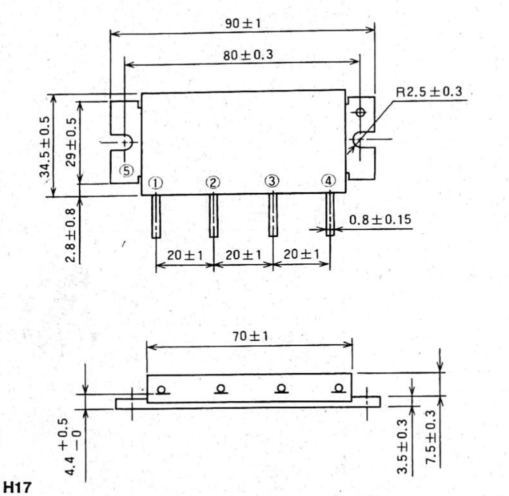
MITSUBISHI ELECTRIC

M67703UH

470~490MHz, 12.5V, 45-50W, FM MOBILE RADIO

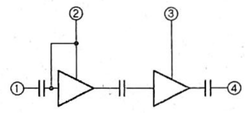
OUTLINE DRAWING

Dimensions in mm



H17

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

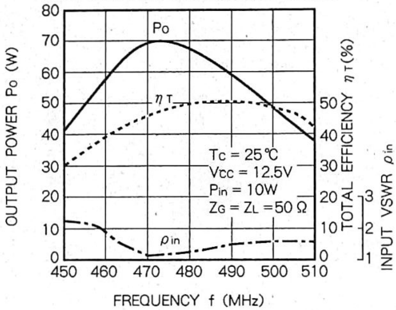
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		25	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	18	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	80	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

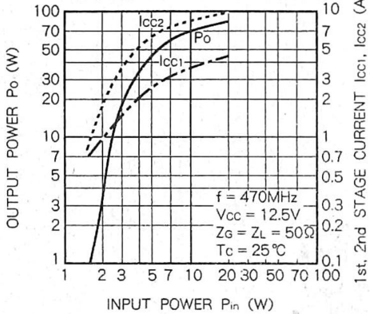
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 10W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	470	490	MHz
Po	Output power		50		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.2V Po = 50W (P_{in} : controlled) Load VSWR=8.8:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

TYPICAL PERFORMANCE DATA

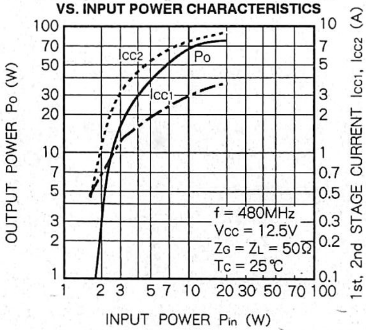
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



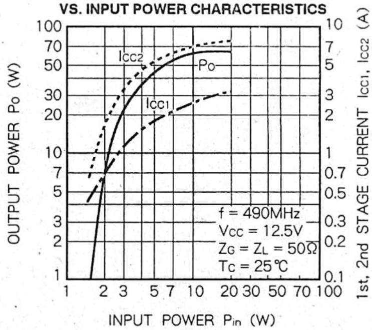
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



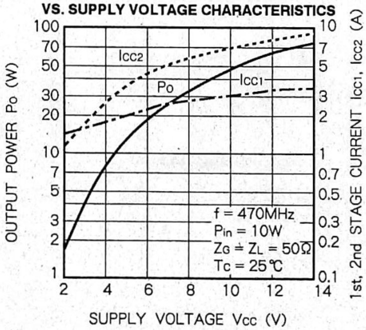
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



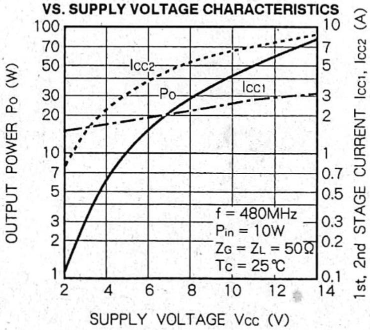
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



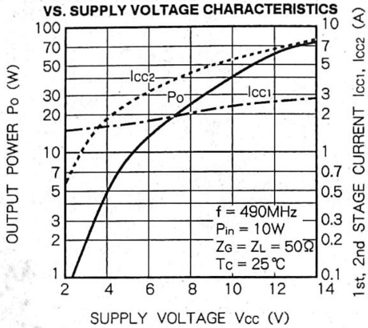
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



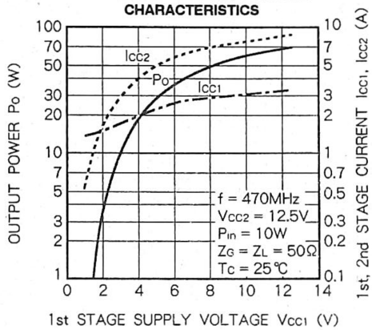
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



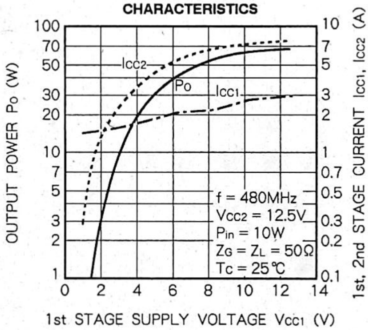
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



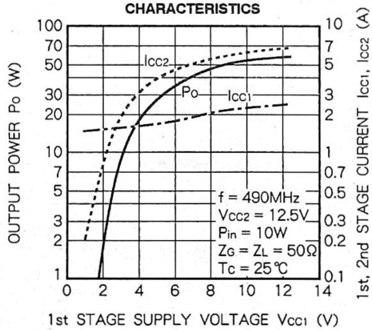
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

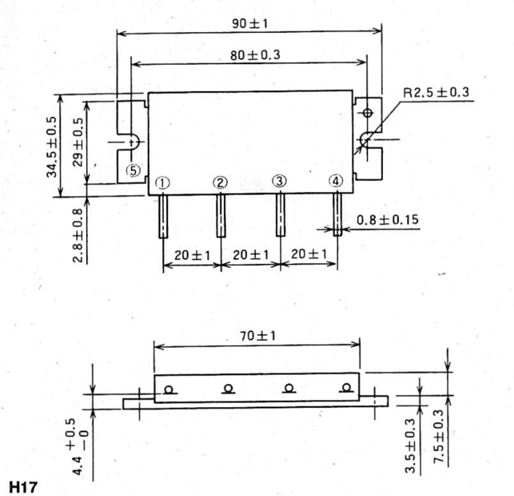


M67703SH

490~512MHz, 12.5V, 45-50W, FM MOBILE RADIO

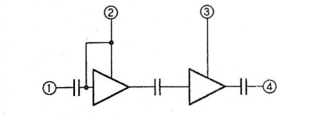
OUTLINE DRAWING

Dimensions in mm



H17

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		25	A
Pin(max)	Input power	ZG = ZL = 50 Ω	18	W
Po(max)	Output power	ZG = ZL = 50 Ω	80	W
TC(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	Pin = 10W Vcc = 12.5V ZG = ZL = 50 Ω	490	512	MHz
Po	Output power		50		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V Po = 50W (Pin : controlled) Load VSWR=8.8:1(All phase), 2sec. ZG = 50 Ω	No degradation		−

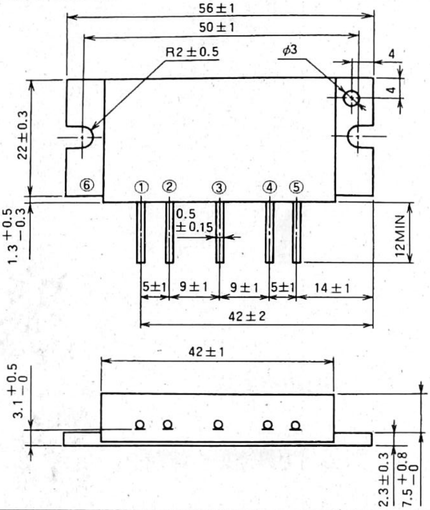
MITSUBISHI ELECTRIC

M67704

142~175MHz, 12.5V, 13W, FM MOBILE RADIO

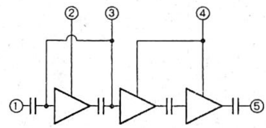
OUTLINE DRAWING

Dimensions in mm



H16

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③VBB : BASE BIAS
③Vcc2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
V_{BB}			6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

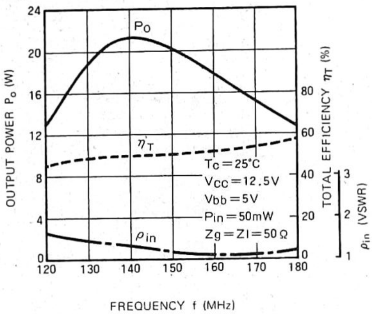
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	142	175	MHz
Po	Output power		13		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 15.2V, V_{BB} = 5V Po = 13W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

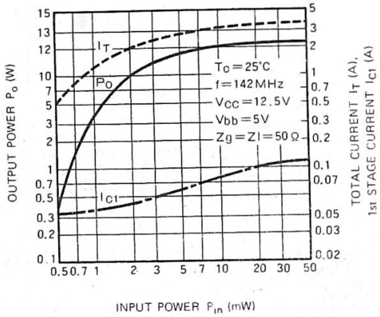
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

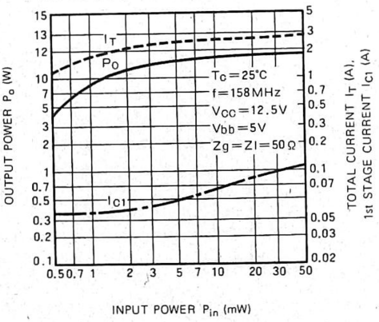
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



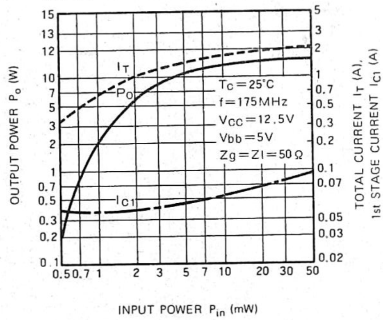
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



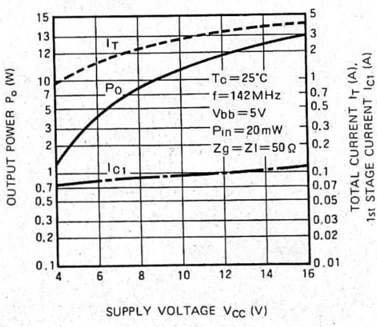
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



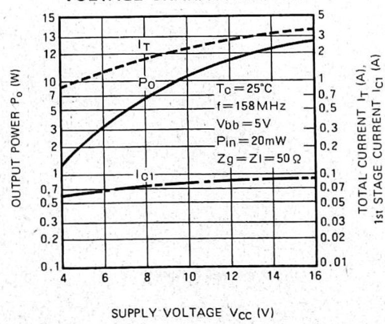
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



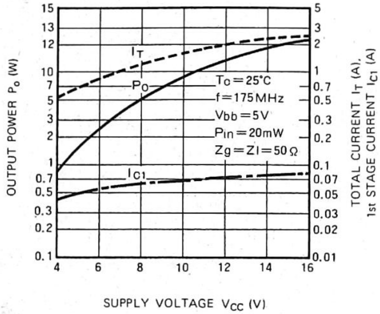
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



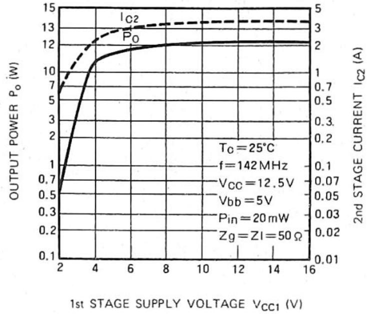
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



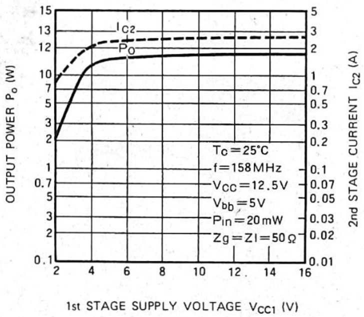
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



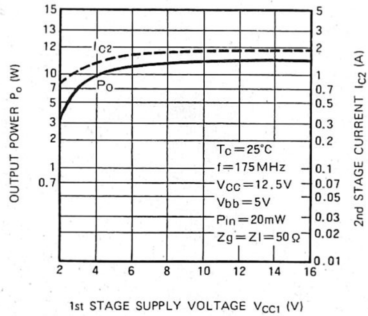
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



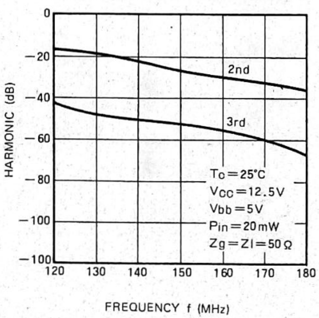
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS

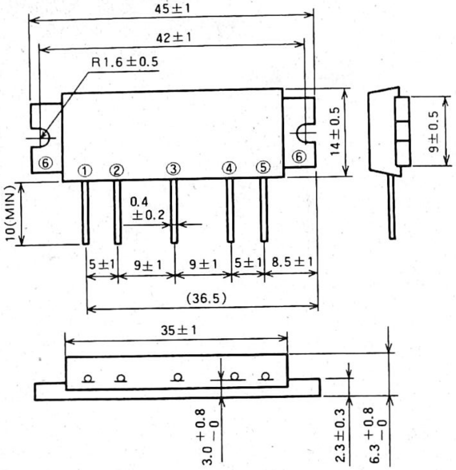


M67705UL

380~400MHz, 9.6V, 7W, FM PORTABLE RADIO

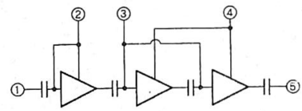
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② V_{CC1} : 1st. DC SUPPLY
③ V_{BB} : BASE BIAS
④ V_{CC2} : 2nd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leq 5V$	13	V
V_{BB}		$V_{CC} \leq 9.6V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

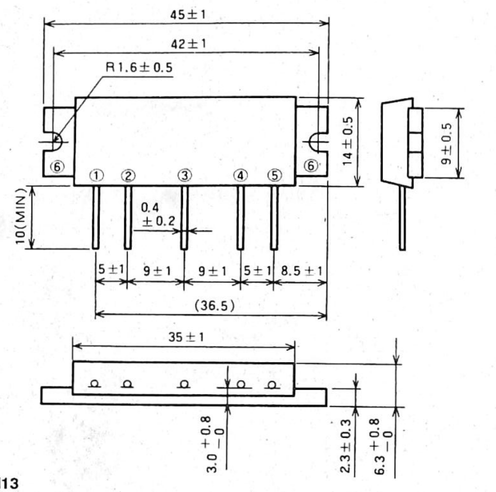
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 9.6V $Z_G = Z_L = 50\ \Omega$	380	400	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 9.6V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

M67705L

400~430MHz, 9.6V, 7W, FM PORTABLE RADIO

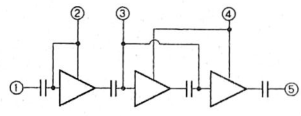
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VBB : BASE BIAS
④ VCC2 : 2nd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	13	V
V_{BB}		$V_{CC} \leqq 9.6V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

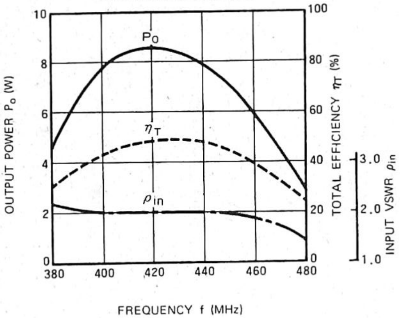
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 9.6V $Z_G = Z_L = 50\ \Omega$	400	430	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 9.6V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

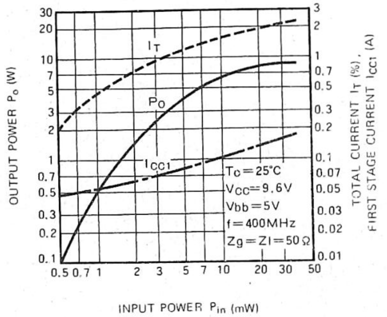
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

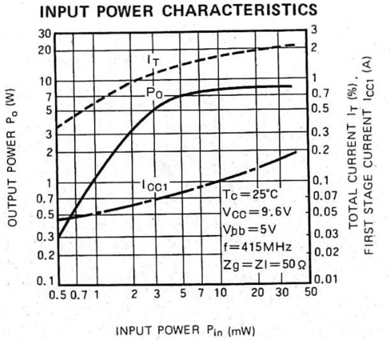
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



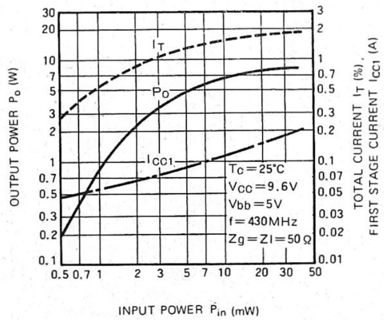
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



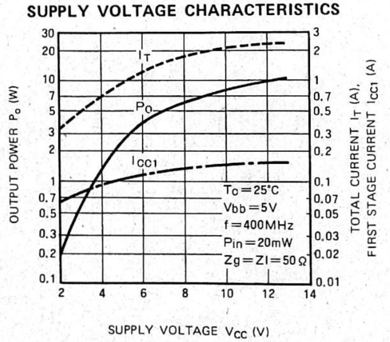
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



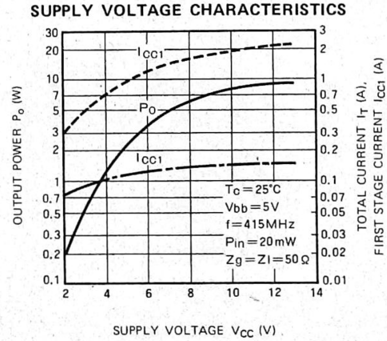
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



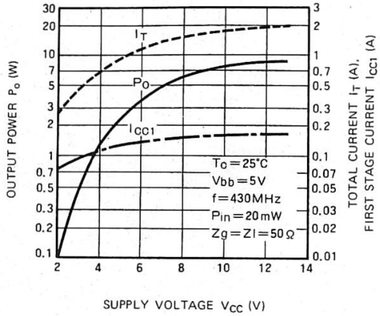
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



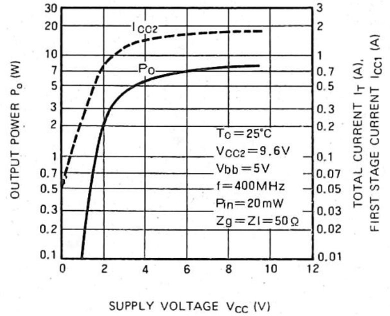
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



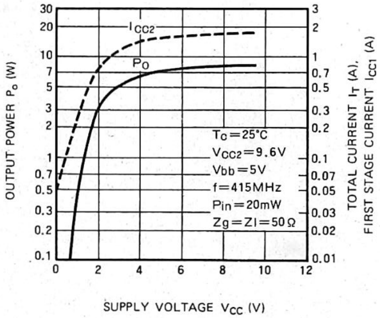
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



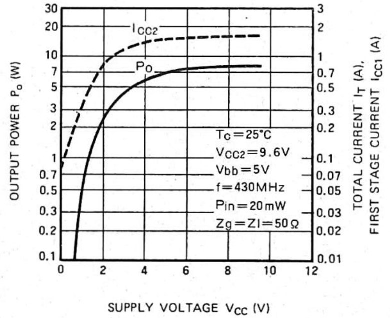
OUTPUT POWER, FINAL CURRENT VS. FIRST STAGE SUPPLY CHARACTERISTICS



OUTPUT POWER, FIRST STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



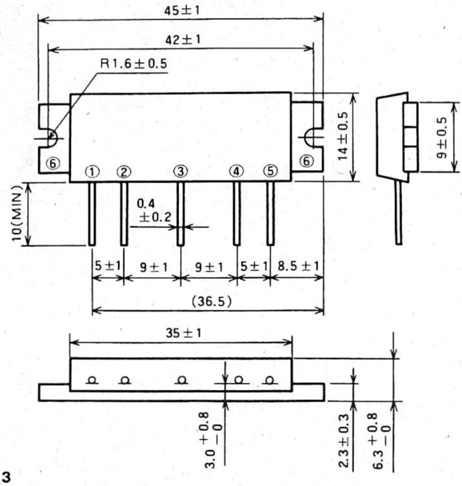
OUTPUT POWER, FIANL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



M67705M

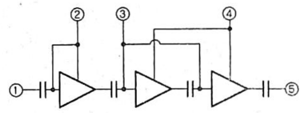
430~470MHz, 9.6V, 7W, FM PORTABLE RADIO

OUTLINE DRAWING Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

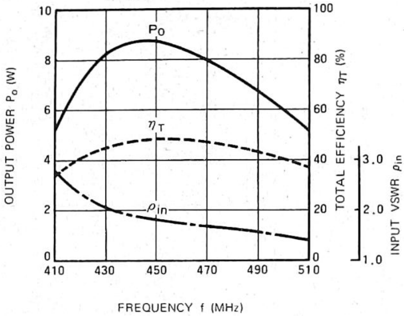
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	13	V
V_{BB}		$V_{CC} \leqq 9.6V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

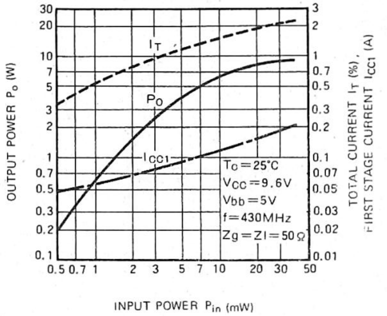
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 9.6V $Z_G = Z_L = 50\ \Omega$	430	470	MHz
P_o	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 9.6V, V_{BB} = 5V P_o = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

TYPICAL PERFORMANCE DATA

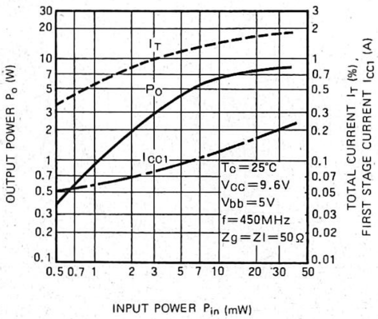
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



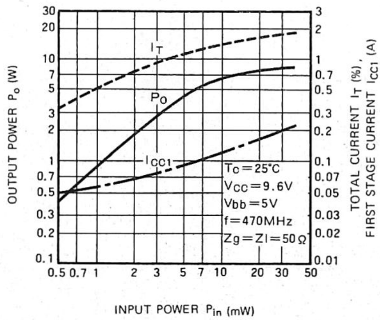
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



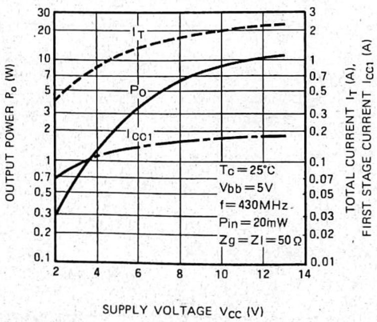
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



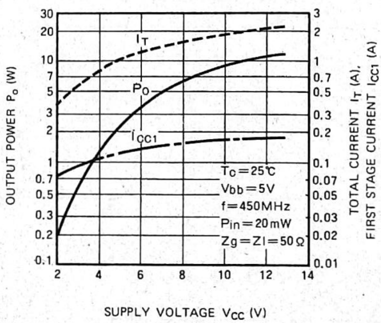
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



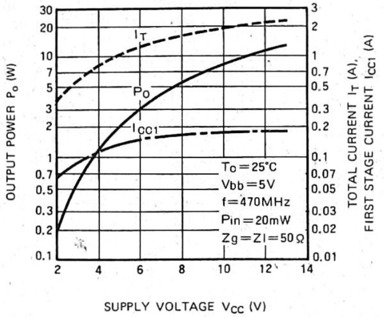
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



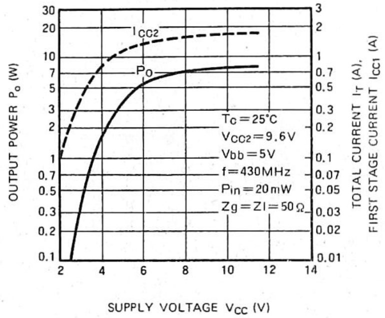
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



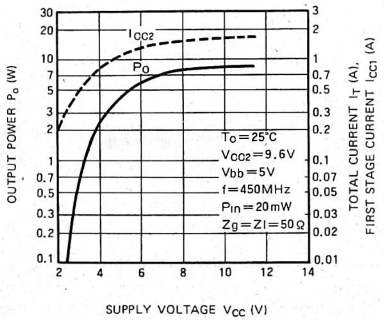
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



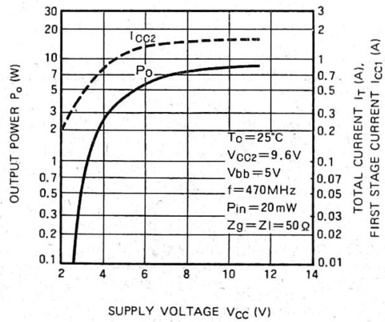
OUTPUT POWER, FINAL CURRENT VS. FIRST STAGE SUPPLY CHARACTERISTICS



OUTPUT POWER, FIRST STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FIANL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

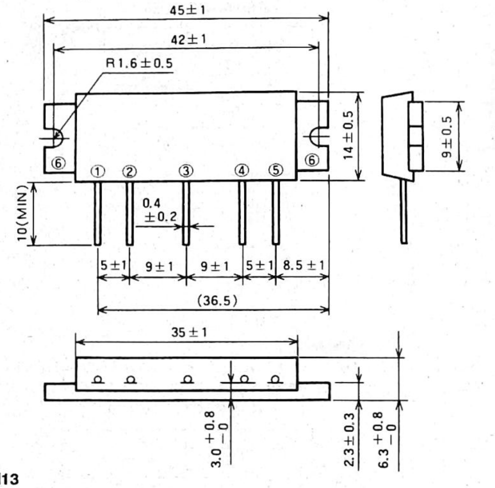


M67705H

470~512MHz, 9.6V, 7W, FM PORTABLE RADIO

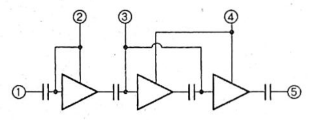
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	13	V
V_{BB}		$V_{CC} \leqq 9.6V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

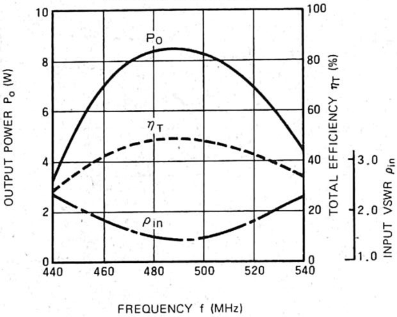
ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range		470	512	MHz
P_O	Output power	P_{in} = 20mW V_{BB} = 5V V_{CC} = 9.6V $Z_G = Z_L = 50\Omega$	7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 9.6V, V_{BB} = 5V P_O = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		−

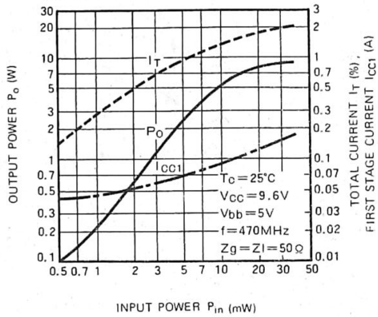
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

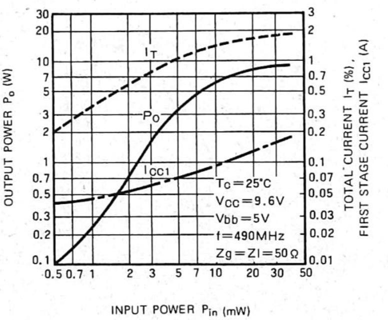
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



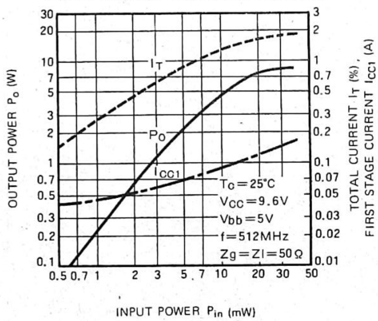
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



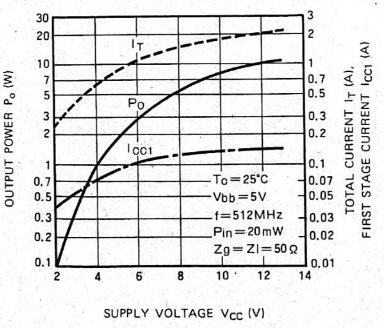
OUTPUT POWER, TOTAL CURRENT FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



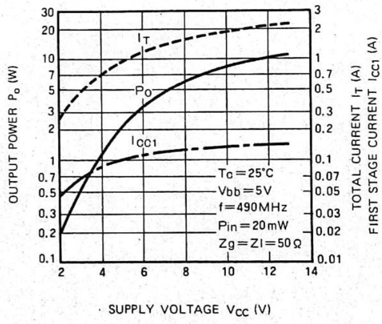
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



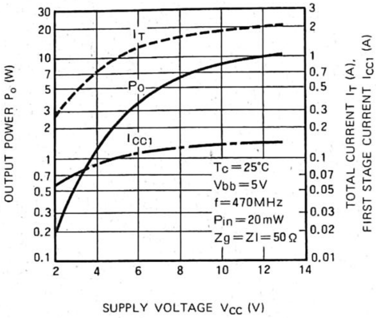
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



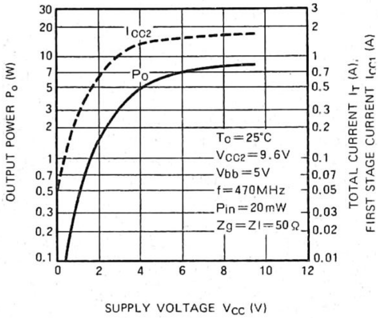
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



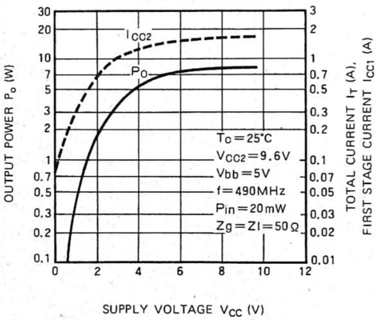
OUTPUT POWER, TOTAL CURRENT, FIRST STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



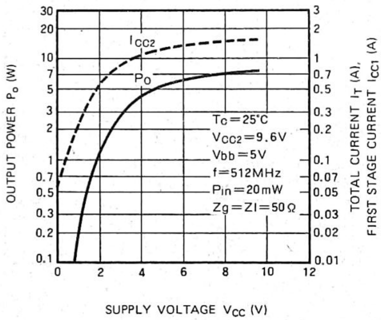
OUTPUT POWER, FINAL CURRENT VS. FIRST STAGE SUPPLY CHARACTERISTICS



OUTPUT POWER, FIRST STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, FIANL STAGE CURRENT VS. FIRST STAGE SUPPLY VOLTAGE CHARACTERISTICS

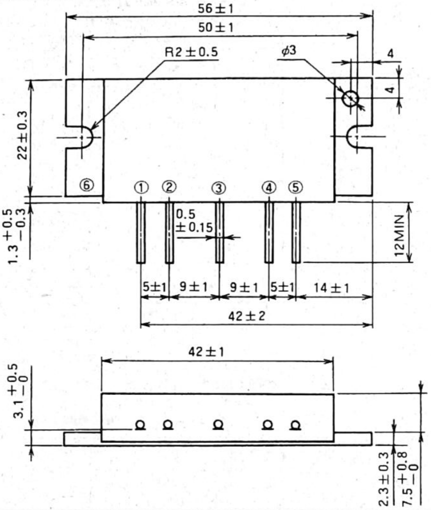


M67709L

350~390MHz, 12.5V, 13W, FM MOBILE RADIO

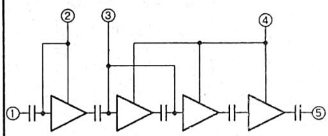
OUTLINE DRAWING

Dimensions in mm



H16

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③VBB : BASE BIAS
③Vcc2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

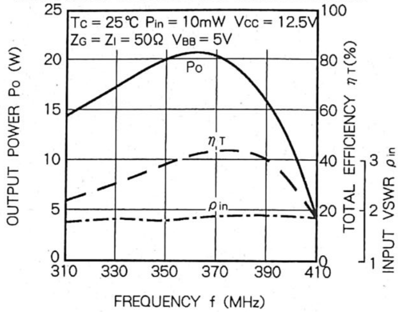
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leq 5V$	16	V
V_{BB}		$V_{CC} \leq 12.5V$	6	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	20	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

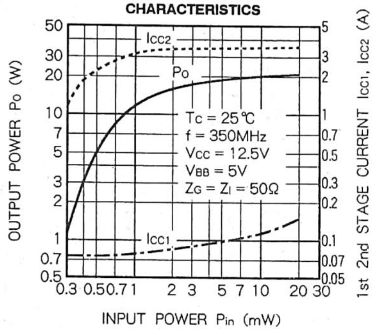
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 10mW $V_{CC1,2}$ = 12.5V V_{BB} = 5V $Z_G = Z_L = 50\ \Omega$	350	390	MHz
Po	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC1}=12.5V, V_{CC2}=15.2V, V_{BB}=5V Po = 13W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

TYPICAL PERFORMANCE DATA

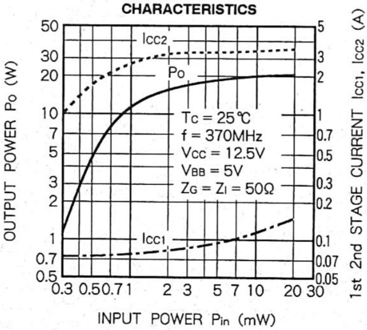
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR. VS. FREQUENCY CHARACTERISTICS



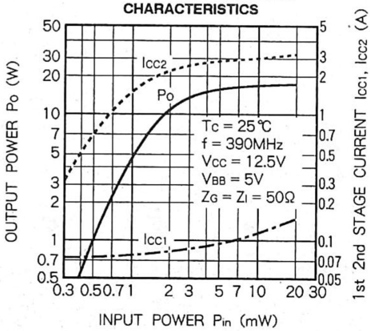
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



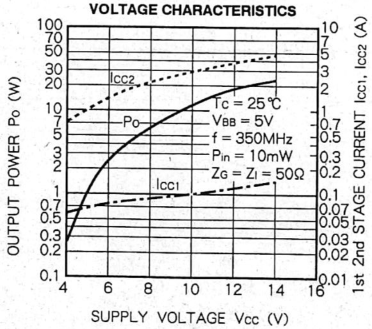
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



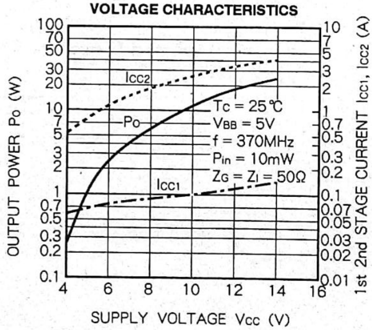
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



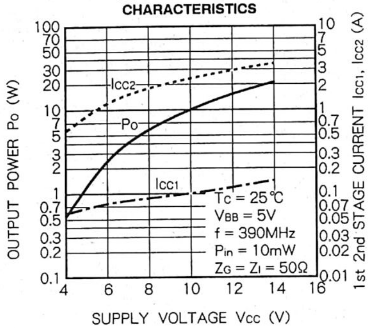
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



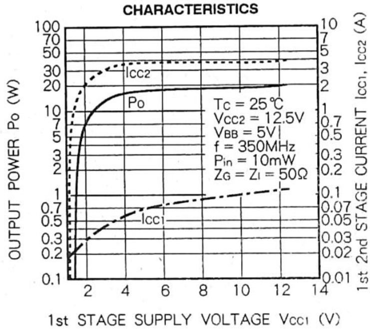
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



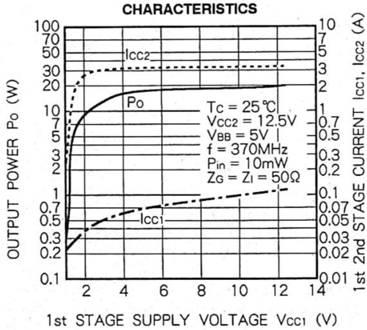
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



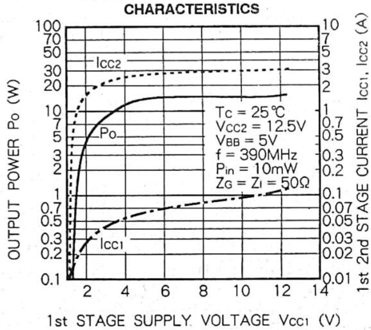
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

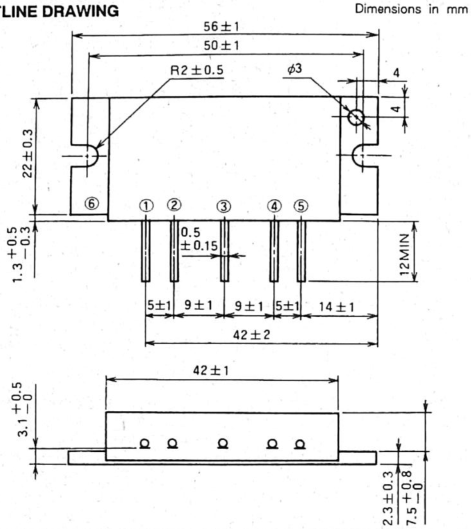


M67709

430~470MHz, 12.5V, 13W, FM MOBILE RADIO

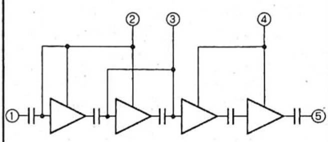
OUTLINE DRAWING

Dimensions in mm



H16

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② V_{CC1} : 1st. DC SUPPLY
③ V_{BB} : BASE BIAS
③ V_{CC2} : 2nd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	20	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 10mW $V_{CC1,2}$ = 12.5V V_{BB} = 5V $Z_G = Z_L = 50\ \Omega$	430	470	MHz
Po	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC1}=12.5V, V_{CC2}=15.2V, V_{BB}=5V Po = 13W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

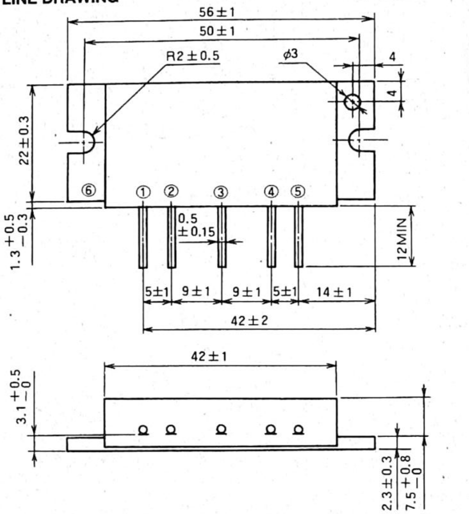
MITSUBISHI ELECTRIC

M67709M

390~430MHz, 12.5V, 13W, FM MOBILE RADIO

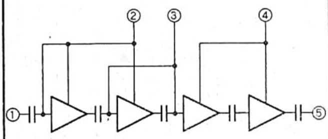
OUTLINE DRAWING

Dimensions in mm



H16

BLOCK DIAGRAM



PIN :
① P_{in} : RF INPUT
② V_{CC1} : 1st. DC SUPPLY
③ V_{BB} : BASE BIAS
③ V_{CC2} : 2nd. DC SUPPLY
⑤ P_O : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	20	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

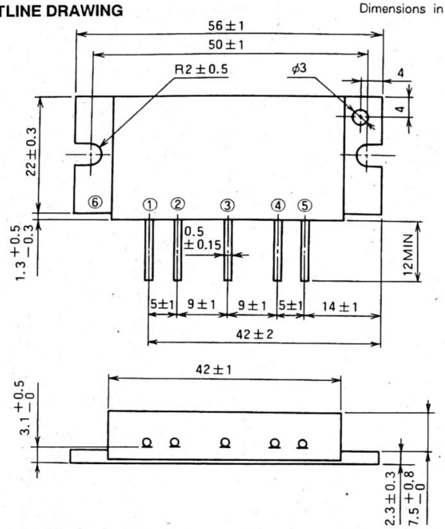
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 10mW$ $V_{CC1,2} = 12.5V$ $V_{BB} = 5V$ $Z_G = Z_L = 50\ \Omega$	390	430	MHz
Po	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC1} = 12.5V$, $V_{CC2} = 15.2V$, $V_{BB} = 5V$ $P_O = 13W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		−

M67709SH

490~512MHz, 12.5V, 13W, FM MOBILE RADIO

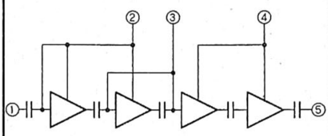
OUTLINE DRAWING

Dimensions in mm



H16

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
③VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	20	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 10mW, $V_{CC1,2}$ = 12.5V, V_{BB} = 5V, $Z_G = Z_L = 50\ \Omega$	490	512	MHz
Po	Output power		13		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	
ρ_{in}	Input VSWR			2.8	—
−	Load VSWR tolerance	V_{CC1} = 12.5V, V_{CC2}= 15.2V, V_{BB} = 5V Po = 13W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

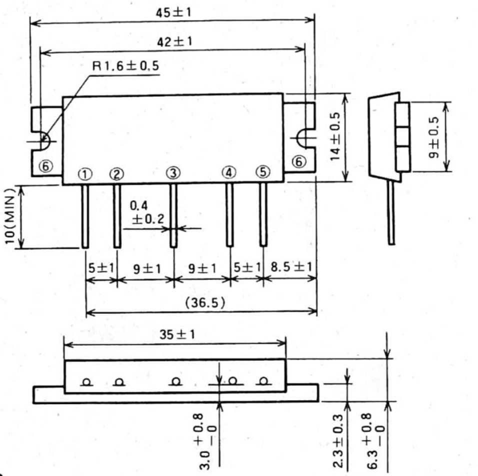
MITSUBISHI ELECTRIC

M67710L

135~160MHz, 9.6V, 7W, FM PORTABLE RADIO

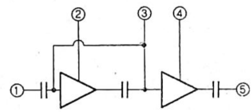
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		13	V
V_{BB}			6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	80	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

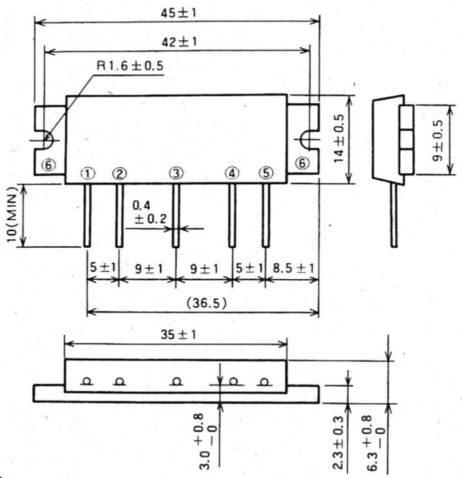
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 50mW V_{BB} = 5V V_{CC} = 9.6V $Z_G = Z_L = 50\ \Omega$	135	160	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC1,2}$ = 13V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

M67710H

150~175MHz, 9.6V, 7W, FM PORTABLE RADIO

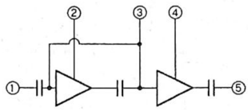
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤PO : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		13	V
V_{BB}			6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	80	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

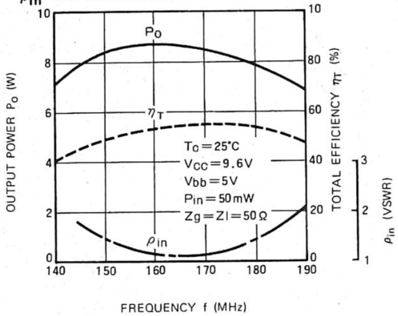
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 50mW$ $V_{BB} = 5V$ $V_{CC} = 9.6V$ $Z_G = Z_L = 50\ \Omega$	150	175	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC1,2} = 13V$, $V_{BB} = 5V$ $P_O = 7W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

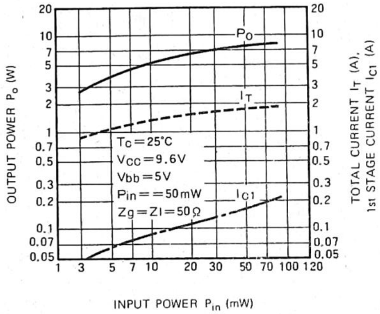
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

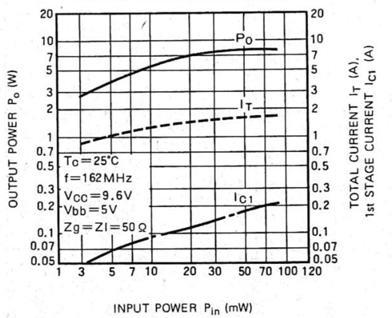
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



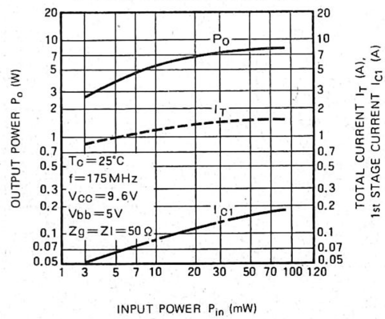
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



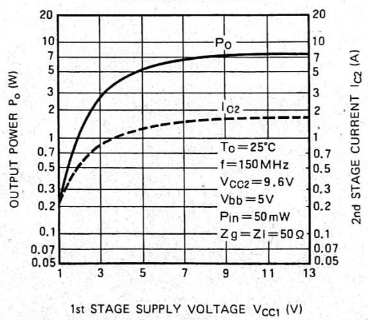
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



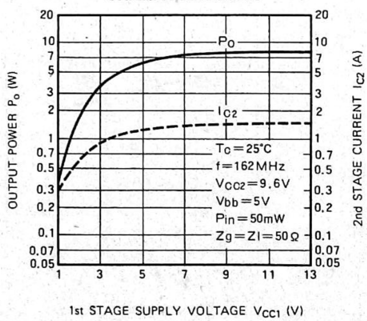
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



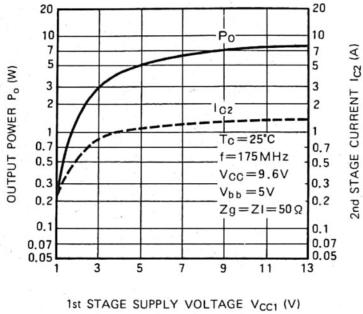
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



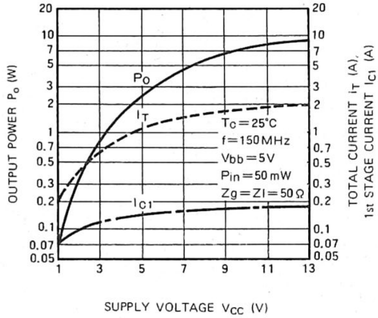
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



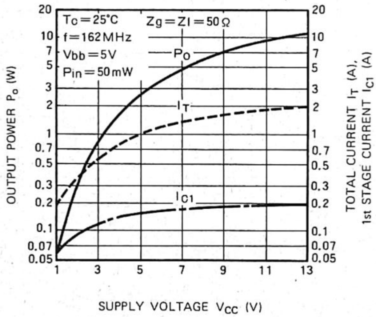
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



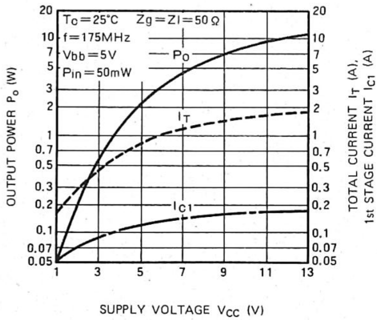
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



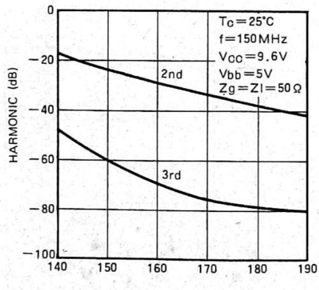
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS

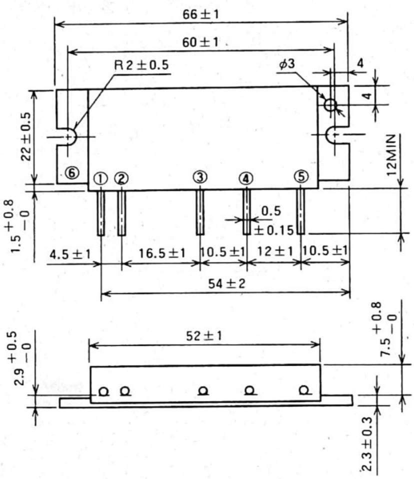


M67711

1240~1300MHz, 12.5V, 16W, FM MOBILE RADIO

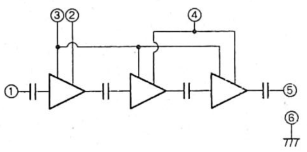
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS DC SUPPLY
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

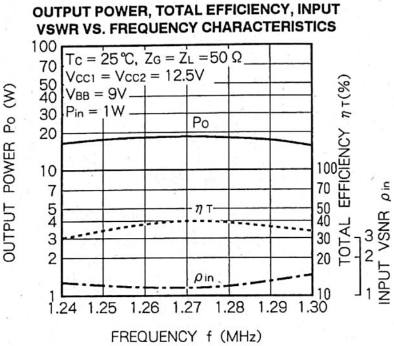
Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1, 2}$	Supply voltage		17	V
V_{BB}			10	V
Icc	Total current		8	A
$P_{in(max)}$	Input power	V_{CC1}=12.5V, V_{BB}=9V, Z_G=Z_L=50Ω	2	W
$P_{o(max)}$	Output power	Z_G = Z_L = 50 Ω	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

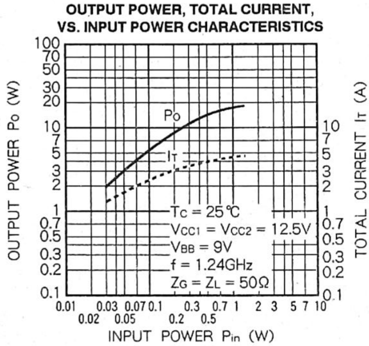
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

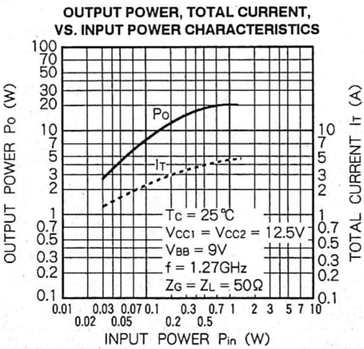
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	V_{CC1} = V_{CC2} = 12.5V V_{BB} = 9V P_{in} = 1W Z_G = Z_L = 50 Ω	1240	1300	MHz
Po	Output power		16		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−45	dB
ρ_{in}	Input VSWR			2.0	−
−	Load VSWR tolerance	V_{CC1} = V_{CC2} = 15.2V, V_{BB} = 9V Po = 16W (P_{in} : controlled) Load VSWR=16:1(All phase), 5sec.	No degradation		−

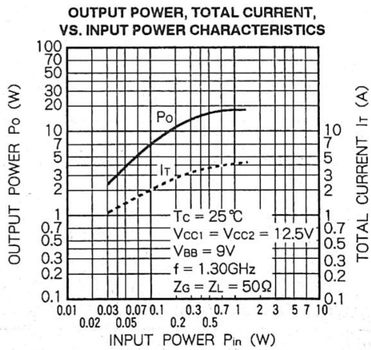
MITSUBISHI ELECTRIC

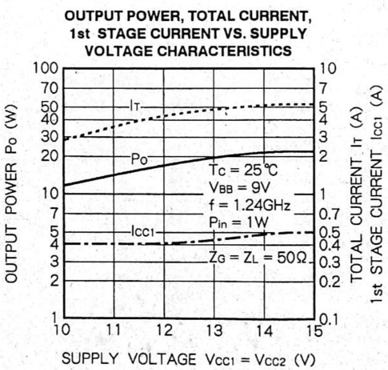
TYPICAL PERFORMANCE DATA

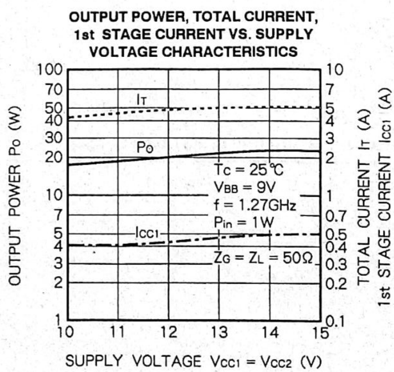




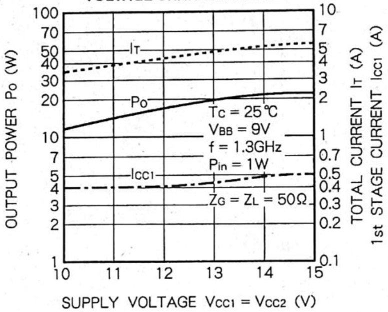




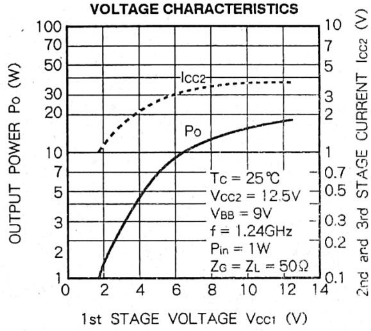




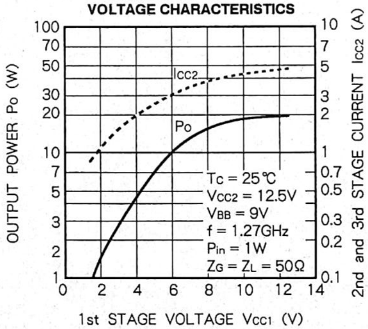
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



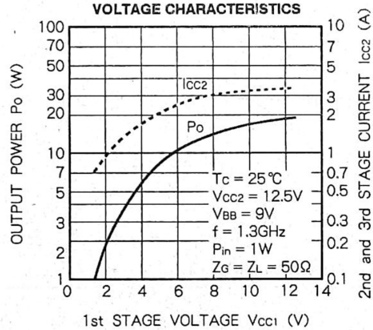
OUTPUT POWER, 2nd and 3rd STAGE CURRENT VS. 1st STAGE VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd and 3rd STAGE CURRENT VS. 1st STAGE VOLTAGE CHARACTERISTICS



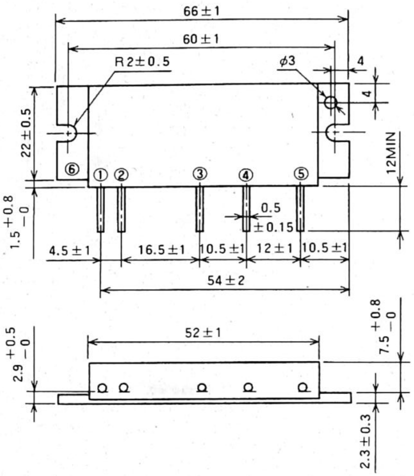
OUTPUT POWER, 2nd and 3rd STAGE CURRENT VS. 1st STAGE VOLTAGE CHARACTERISTICS



M67712

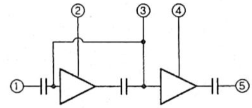
220~225MHz, 12.5V, 30W, SSB MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

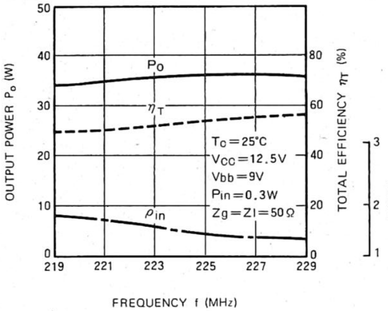
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
V_{BB}	Base bias		10	V
I_{CC}	Total current		7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.65	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

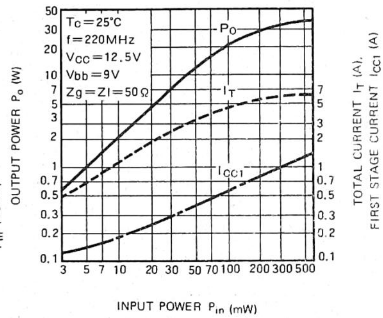
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 0.3W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	220	225	MHz
Po	Output power		30		W
η_T	Total efficiency		43		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $V_{BB} = 9V$ $P_O = 30W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

TYPICAL PERFORMANCE DATA

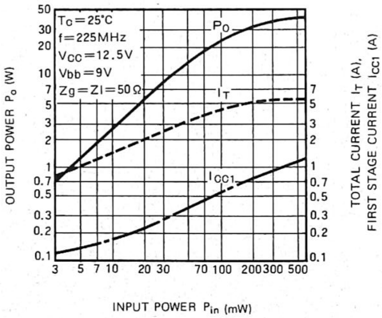
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



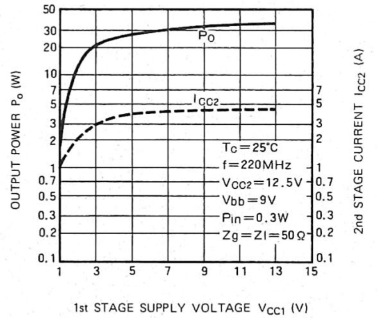
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



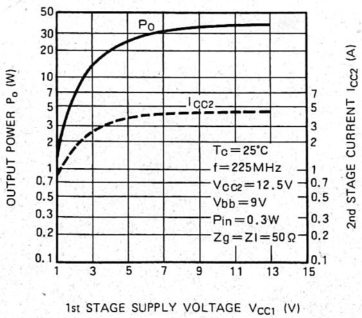
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



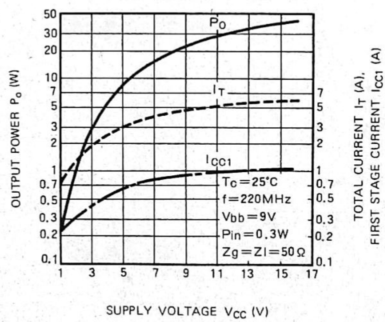
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



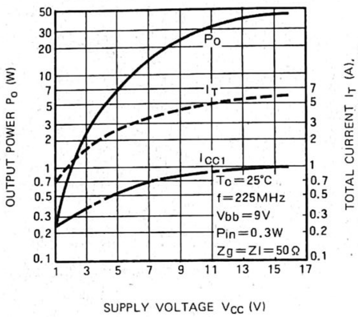
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



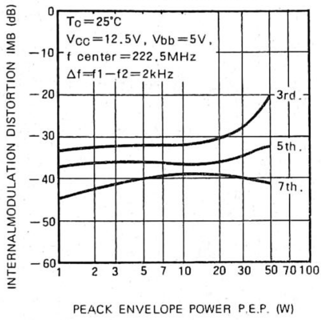
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



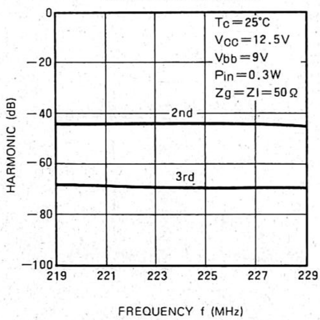
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



INTERNALMODULATION DISTORTION VS. PEACK ENVELOPE POWER CHARACTERISTICS



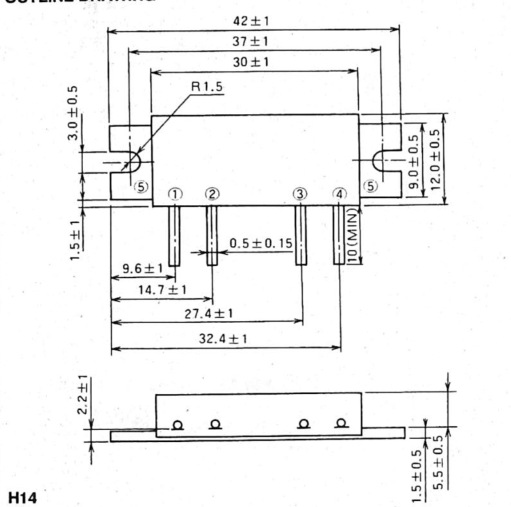
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



M67713

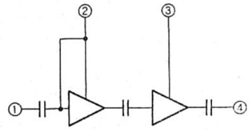
220~225MHz, 12.5V, 7W, FM PORTABLE RADIO

OUTLINE DRAWING Dimensions in mm



H14

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VBB : BASE BIAS
③VCC1 : DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

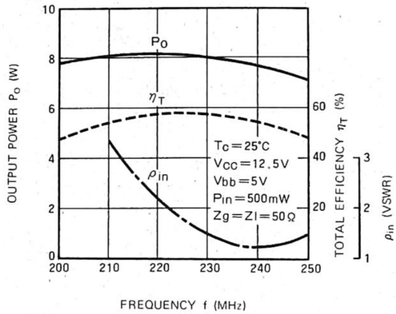
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
V_{BB}			6	V
I_{CC}	Total current		3	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\Omega$	1	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

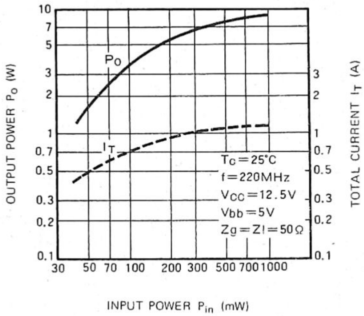
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 400mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\Omega$	220	225	MHz
P_o	Output power		7		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2} = 13.2V, V_{BB} = 5V P_o = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		−

TYPICAL PERFORMANCE DATA

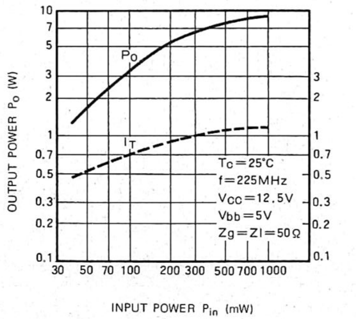
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



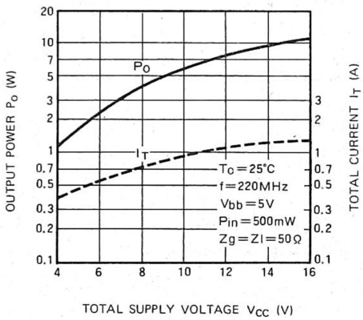
OUTPUT POWER, TOTAL CURRENT VS. INPUT POWER CHARACTERISTICS



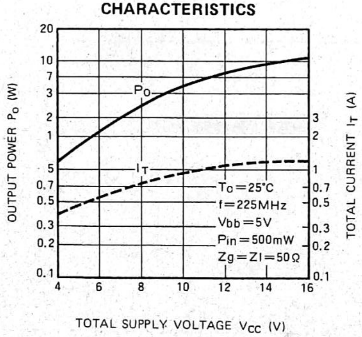
OUTPUT POWER, TOTAL CURRENT VS. INPUT POWER CHARACTERISTICS



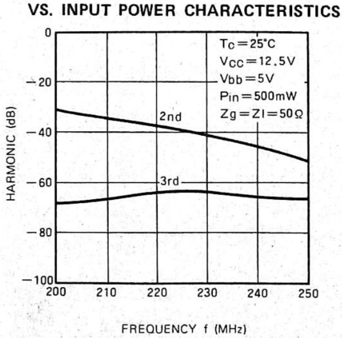
OUTPUT POWER, TOTAL CURRENT VS. TOTAL SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, TOTAL CURRENT VS. TOTAL SUPPLY VOLTAGE CHARACTERISTICS



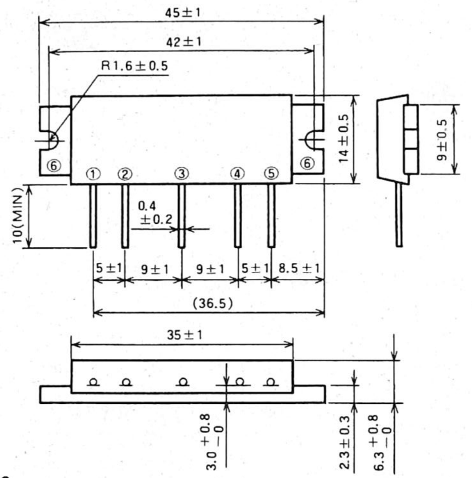
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS CURRENT VS. INPUT POWER CHARACTERISTICS



M67715

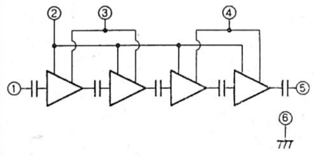
1240~1300MHz, 8V, 1.2W, SSB PORTABLE RADIO

OUTLINE DRAWING Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④Vcc2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st, DC supply		9	V
V_{BB}	Base bias		9	V
V_{CC2}	2nd. DC supply		16	V
I_{CC}	Total current		1.5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	10	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	4	W
$T_{C(OP)}$	Operation case temperature		−20~100	℃
T_{stg}	Storage temperature		−40~110	℃

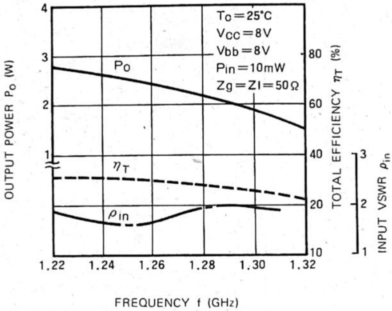
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = V_{BB} = 8V$ $P_{in} = 10mW$ $Z_G = Z_L = 50\,\Omega$	1240	1300	MHz
Po	Output power		1.2		W
η_T	Total efficiency		18		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC1} = 9V$, $V_{CC2} = 15.2V$, $V_{BB} = 9V$ Po = 1.5W(P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=10:1(All phase), 5sec	No degradation		−
IMD_3	3rd. inter modulation distortion	$V_{CC1}=V_{CC2}=V_{BB}=8V$ $P_{o(PEP)}=1.26W$, $\Delta f=20kHz$, $Z_G=Z_L=50\Omega$		−23	dBc

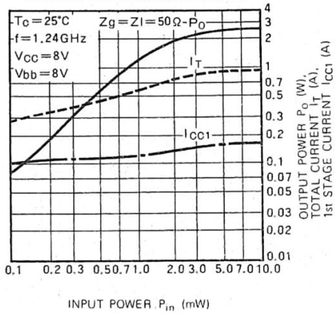
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

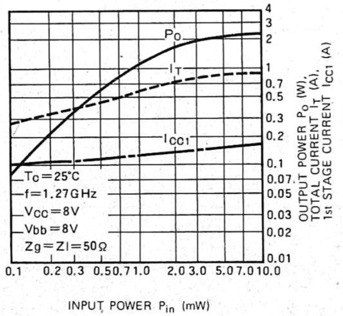
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



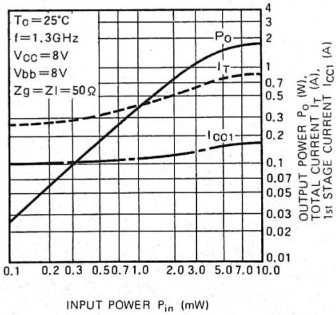
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



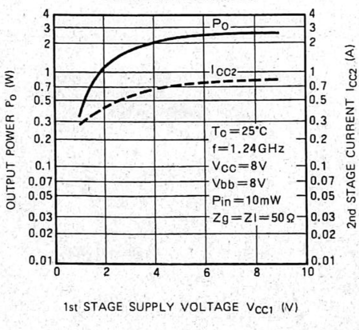
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



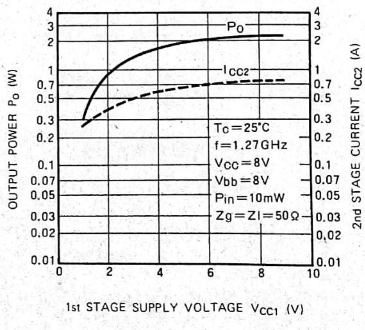
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



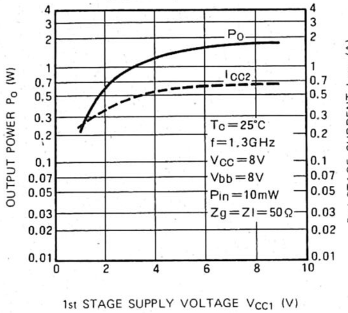
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



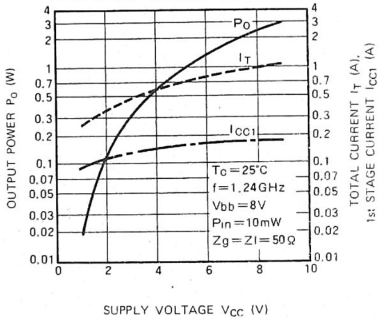
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



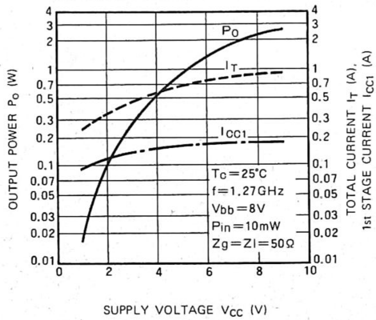
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



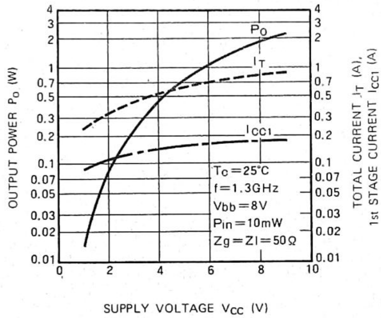
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



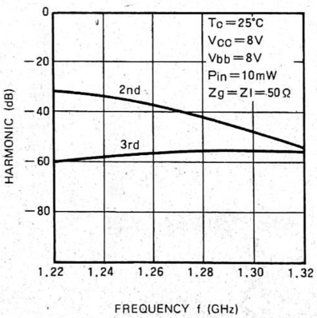
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS

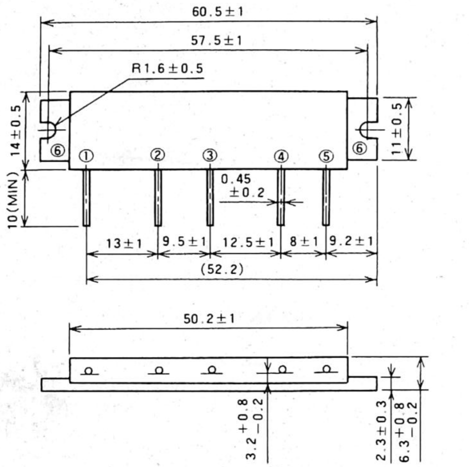


M67717

872~905MHz, 12.5V, 7W, FM MOBILE RADIO

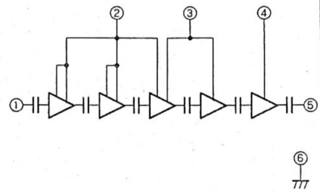
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		9	V
V_{CC2}			9	V
V_{CC3}			17	V
I_{CC}	Total current	$Z_G = Z_L = 50\Omega$	4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\Omega$, $V_{CC1} \leqq 12.5V$	7	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

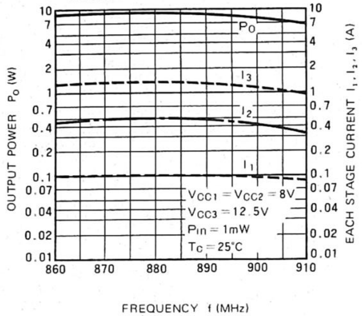
ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$ $P_{in} = 1mW$ $Z_G = Z_L = 50\Omega$	872	905	MHz
Po	Output power		7		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 15.2V$ $P_O = 7W$ (P_{in} : controlled), $Z_G = 50\Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

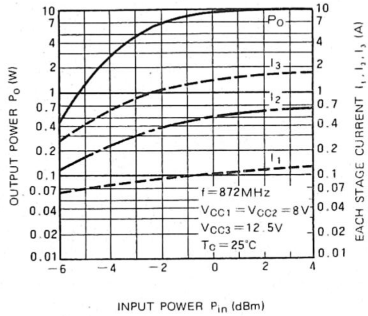
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

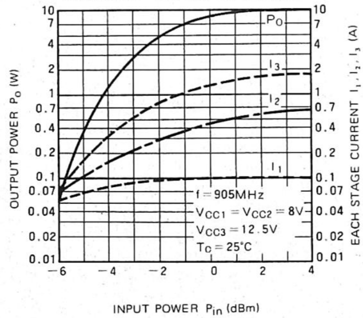
OUTPUT POWER, EACH STAGE CURRENT VS. FREQUENCY



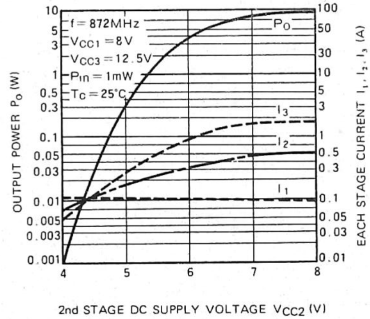
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



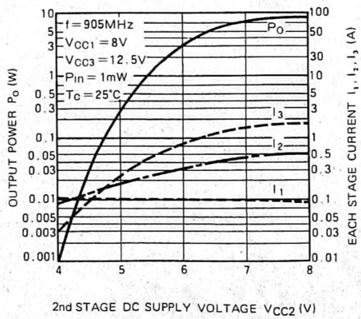
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER



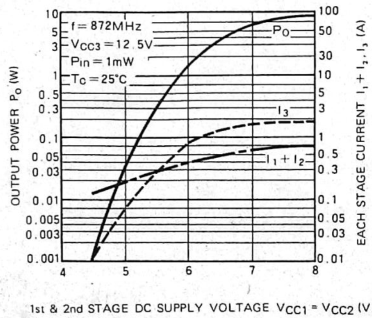
OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



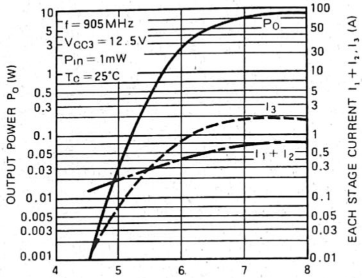
OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



OUTPUT POWER, EACH STAGE CURRENT VS. 1st AND 2nd STAGE DC SUPPLY VOLTAGE



1st & 2nd STAGE DC SUPPLY VOLTAGE $V_{CC1} = V_{CC2}$ (V)

Table 1: The conditions at standard operation

Stage	V_{CC} (V)	I_T (mA)	P_{in} (mW)	P_O (mW)
1st	8	45	1	20
2nd	8	80	20	200
3rd	8	160	200	500
4th	8	496	500	2000
5th	12.5	1100	2000	7000

DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to the following consideration when designing a heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistances between junction of incorporated transistors and case are shown in the followings.

a) First stage transistor
$R_{th(j-c)1} = 20°C/W$ (Typ.)

b) Second stage transistor
$R_{th(j-c)2} = 17.5°C/W$ (Typ.)

c) Third stage transistor
$R_{th(j-c)3} = 16°C/W$ (Typ.)

d) Fourth stage transistor
$R_{th(j-c)4} = 9°C/W$ (Typ.)

e) Final stage transistor
$R_{th(j-c)5} = 6.5°C/W$ (Typ.)

(2) V_{CC}, I_T, RF input & output power conditions at standard operation for each stage transistors are estimated as follows.

$P_O = 7W$, $V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$, $P_{in} = 1mW$, $\eta_T = 35\%$ (minimum ratings),

$I_{1+2} = 0.781A$ (Total current from 1st stage to 4th stage)

$I_3 = 1.1A$ (Current of 5th stage)

The conditions at standard operation for each stage transistors are shown in Table 1.

- Junction temperature of the first stage transistor

$T_{j1} = (V_{CC1} \times I_{T1} - P_{O1} + P_{in}) \times R_{th(j-c)1} + T_C$ (Note 1)
$= (8 \times 0.045 - 0.02 + 0.001) \times 20 + T_C$
$= 6.8 + T_C$ (°C)

Note 1: Case temperature of device

- Junction temperature of the second stage transistor

$T_{j2} = (V_{CC1} \times I_{T2} - P_{O2} + P_{O1}) \times R_{th(j-c)2} + T_C$
$= (8 \times 0.08 - 0.2 + 0.02) \times 17.5 + T_C$
$= 8.1 + T_C$ (°C)

- Junction temperature of the third stage transistor

$T_{j3} = (V_{CC2} \times I_{T3} - P_{O3} + P_{O2}) \times R_{th(j-c)3} + T_C$
$= (8 \times 0.16 - 0.5 + 0.2) \times 16 + T_C$
$= 15.7 + T_C$ (°C)

- Junction temperature of the fourth stage transistor

$T_{j4} = (V_{CC2} \times I_{T4} - P_{O4} + P_{O3}) \times R_{th(j-c)4} + T_C$
$= (8 \times 0.496 - 2 + 0.5) \times 9 + T_C$
$= 22.2 + T_C$ (°C)

- Junction temperature of the final stage transistor

$T_{j5} = (V_{CC3} \times I_{T5} - P_O + P_{O4}) \times R_{th(j-c)5} + T_C$
$= (12.5 \times 1.1 - 7 + 2) \times 6.5 + T_C$
$= 56.9 + T_C$ (°C)

2. Heat sink design

In thermal design of heat sink, keep the case temperature below 90°C at output power P_O = 7W and ambient temperature = 60°C.

The thermal resistance $R_{th(c-a)}$ (Note 2) of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_O/\eta_T) - P_O + P_{in}} = \frac{90 - 60}{(7/0.35 - 7 + 0.001)}$$
$$= 2.31 \text{ (°C/W)}$$

Note 2: Including the contact thermal resistance between device and heat sink

Mounting the device on the heat sink with above thermal resistance, junction temperatures of each transistor become;

T_{j1} = 97°C, T_{j2} = 99°C, T_{j3} = 106°C, T_{j4} = 113°C, T_{j5} = 147°C at T_a = 60°C, T_C = 90°C.

Since the annual average of ambient temperature is 30°C, junction temperatures of each transistor become;

T_{j1} = 67°C, T_{j2} = 69°C T_{j3} = 76°C, T_{j4} = 76°C, T_{j5} = 117°C

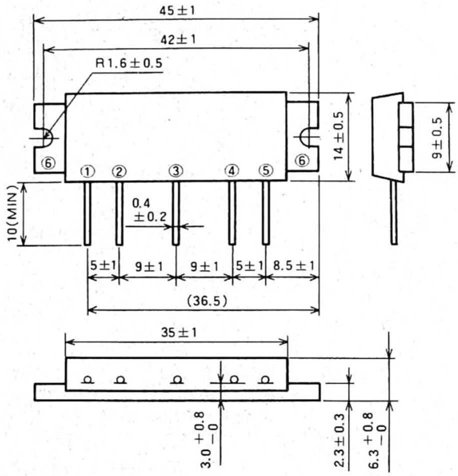
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M67723

220~225MHz, 12.5V, 7W, FM PORTABLE RADIO

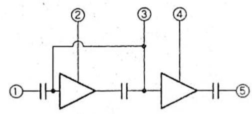
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
V_{BB}			6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

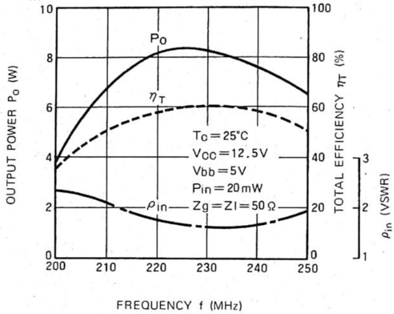
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	220	225	MHz
P_o	Output power		7		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC} = 13.2V, V_{BB} = 5V P_o = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

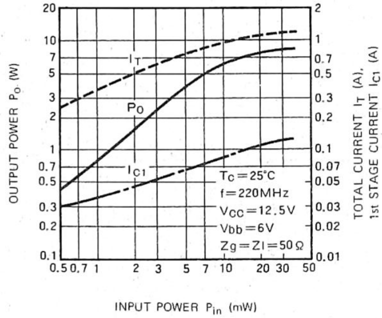
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

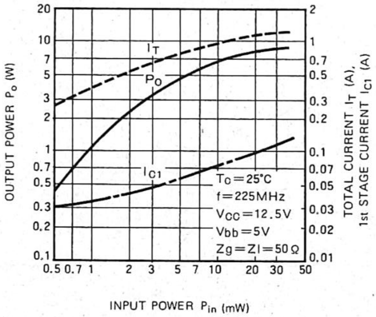
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



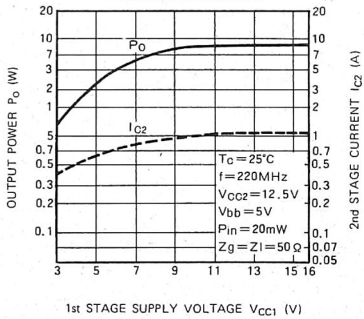
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



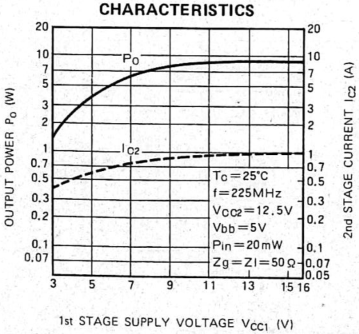
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



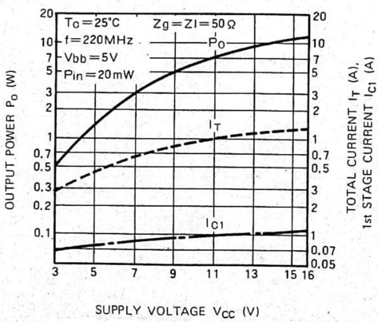
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

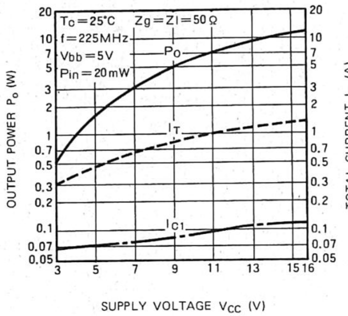


OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

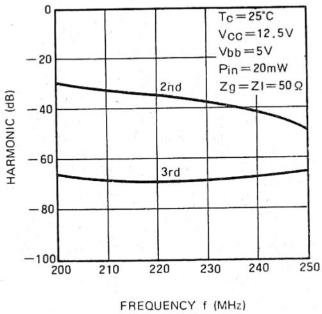


MITSUBISHI ELECTRIC

OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



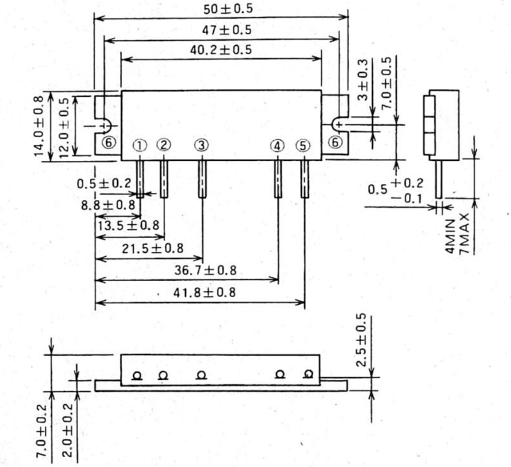
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



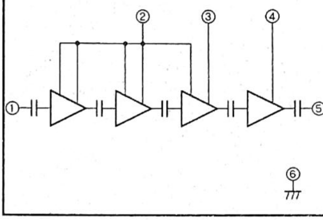
M67724

824~849MHz, 7.2V, 1.6W, FM PORTABLE RADIO

OUTLINE DRAWING Dimensions in mm



BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		9	V
I_{CC}	Total current		3	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$, $V_{CC1} \leqq 7.2V$	7	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	3	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = V_{CC3} = 7.2V$ $P_{in} = 1mW$, $Z_G = Z_L = 50\,\Omega$	824	849	MHz
P_o	Output power		1.6		W
η_T	Total efficiency	$P_o = 1.6W$ (V_{CC1} : controlled) $V_{CC2} = V_{CC3} = 7.2V$ $P_{in} = 1mW$, $Z_G = Z_L = 50\Omega$	35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC2} = V_{CC3} = 9V$ $P_o = 1.6W$ (V_{CC1} : controlled) $P_{in} = 1mW$ Load VSWR=20:1(All phase), 2sec.	No degradation		−

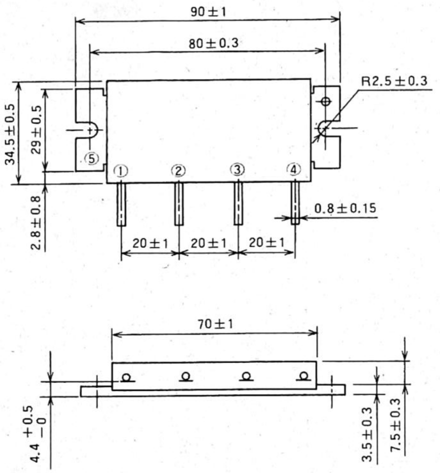
MITSUBISHI ELECTRIC

M67727

144~148MHz, 12.5V, 60W, MOBILE RADIO

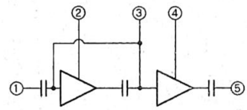
OUTLINE DRAWING

Dimensions in mm



H17

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
V_{BB}			10	V
I_{CC}	Total current		24	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.8	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	78	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

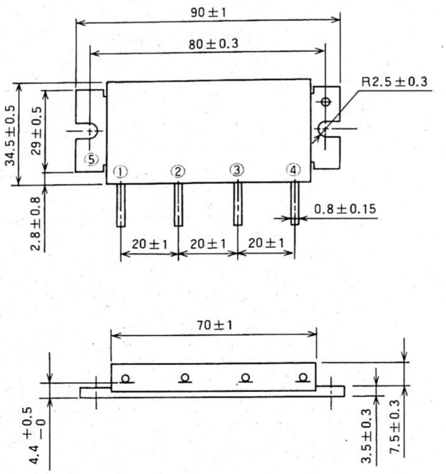
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.5W$ $V_{BB} = 9V$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	144	148	MHz
Po	Output power		60		W
η_T	Total efficiency		50		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.2V$, $V_{BB} = 9V$ Po = 55W (Pin : controlled) Load VSWR=8.8:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M67728

430~450MHz, 12.5V, 60W, SSB MOBILE RADIO

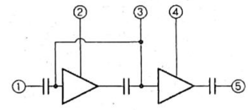
OUTLINE DRAWING

Dimensions in mm



H17

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
V_{BB}			10	V
I_{CC}	Total current		25	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	14	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	78	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

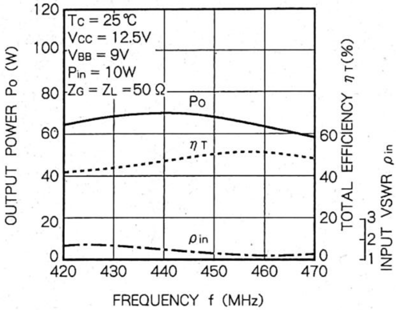
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 10W V_{BB} = 9V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	430	450	MHz
P_O	Output power		60		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2	−
−	Load VSWR tolerance	$V_{CC1,2}$ = 15.2V, V_{BB} = 9V P_O = 55W (P_{in} : controlled) Load VSWR=8.8:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

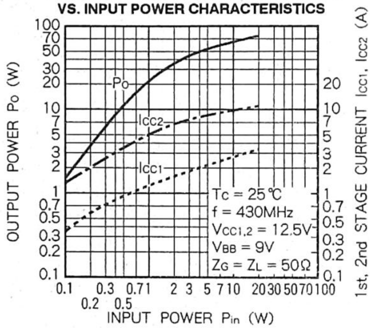
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

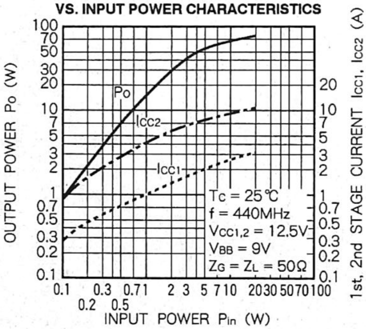
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



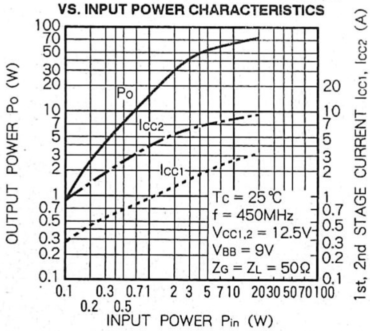
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



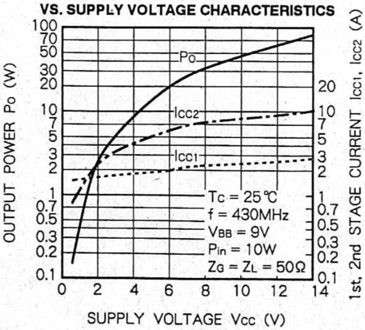
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



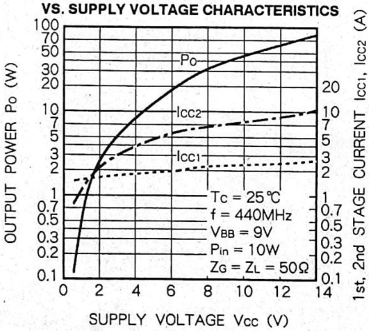
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



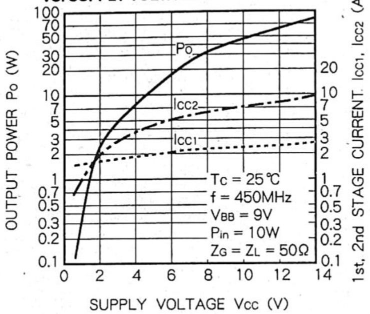
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



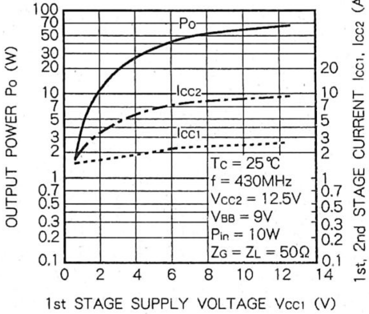
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



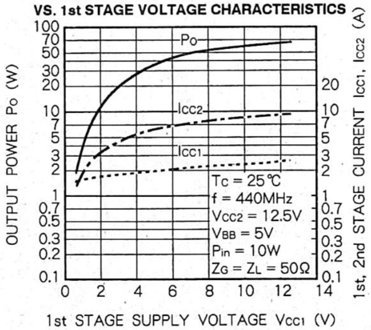
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



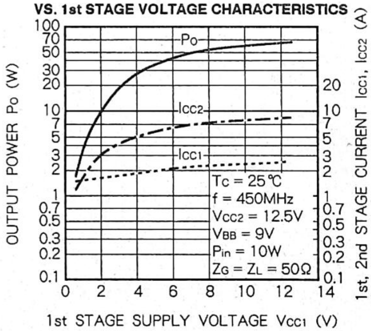
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st 2nd STAGE CURRENT VS. 1st STAGE VOLTAGE CHARACTERISTICS

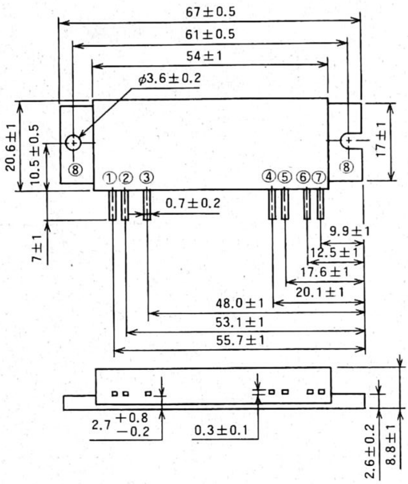


M67729L2

400~420MHz, 12.5V, 20W, FM MOBILE RADIO

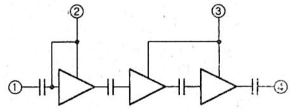
OUTLINE DRAWING

Dimensions in mm



H18

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②GND
③Vcc1 : 1st. DC SUPPLY
④GND
⑤Vcc2 : 2nd. DC SUPPLY
⑥GND
⑦Po : RF OUTPUT
⑧GND : FIN

ABSOLUTE MAXIMUM RATINGS ($T_c = 25$℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
I_{CC}	Total current		6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.3	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	30	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS ($T_c = 25$℃ unless otherwise noted)

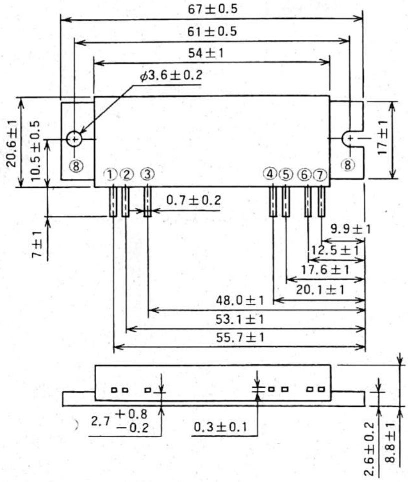
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 0.15W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	400	420	MHz
P_O	Output power		20		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC} = 15.5V$, $P_O = 25W$ (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M67729H2

450~460MHz, 12.5V, 20W, FM MOBILE RADIO

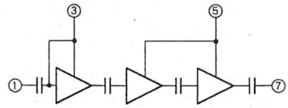
OUTLINE DRAWING

Dimensions in mm



H18

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② GND
③ VCC1 : 1st. DC SUPPLY
④ GND
⑤ VCC2 : 2nd. DC SUPPLY
⑥ GND
⑦ Po : RF OUTPUT
⑧ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		16	V
I_{CC}	Total current		6	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.3	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	30	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

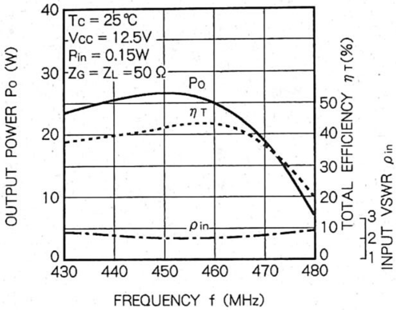
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.15W, V_{CC} = 12.5V, $Z_G = Z_L = 50\ \Omega$	450	460	MHz
P_o	Output power		20		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC} = 15.5V, P_o = 25W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

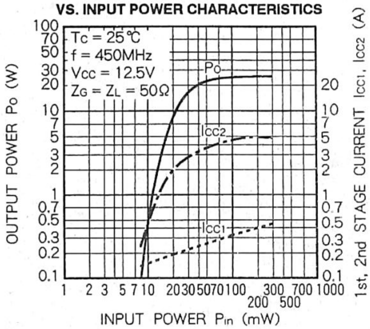
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

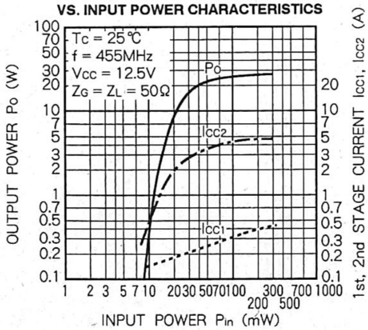
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



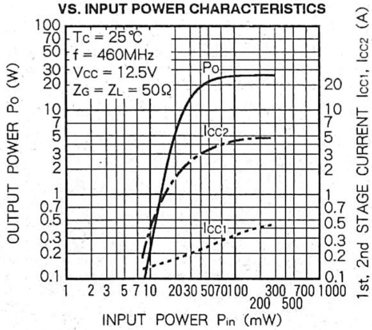
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



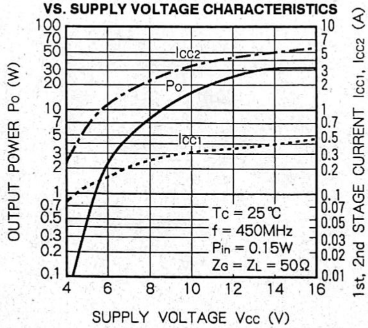
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



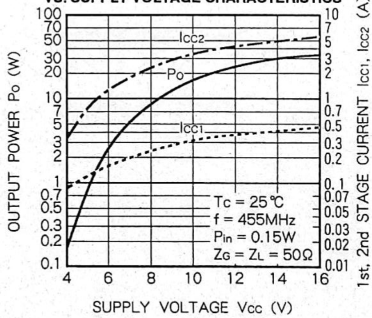
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



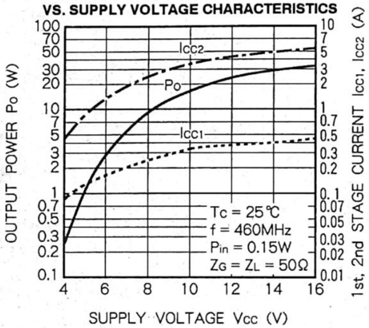
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



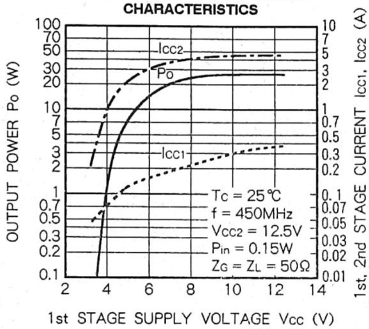
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



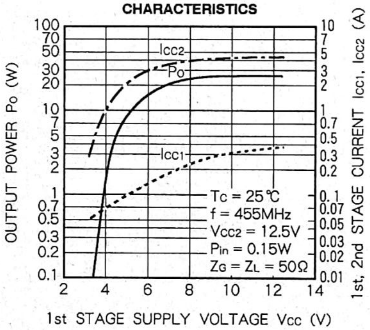
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



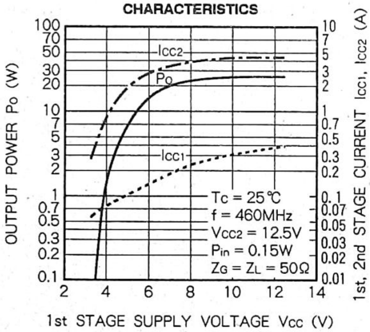
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

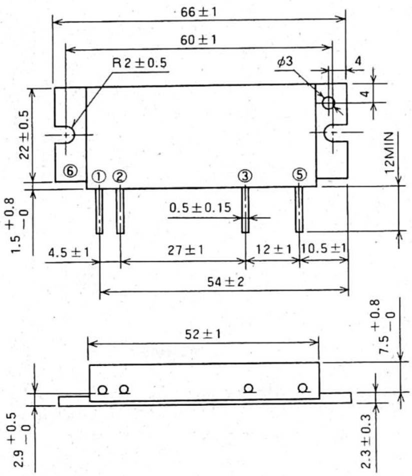


M67730L

175~200MHz, 12.5V, 30W, FM MOBILE RADIO

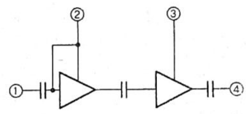
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

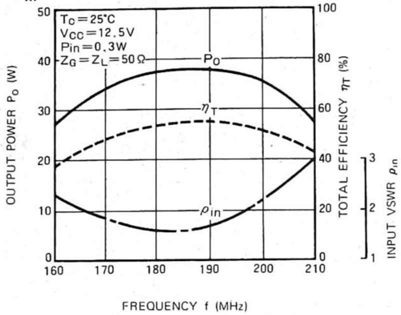
Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	40	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

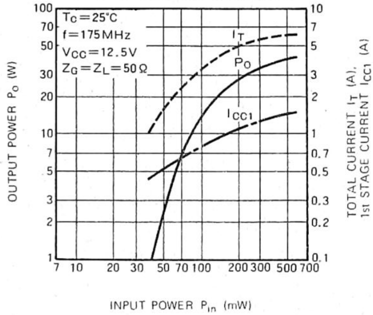
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.3W, Vcc = 12.5V, $Z_G = Z_L = 50\ \Omega$	175	200	MHz
Po	Output power		30		W
η_T	Total efficiency		43		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−35	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (P_{in} : controlled), Load VSWR=20:1 (All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

TYPICAL PERFORMANCE DATA

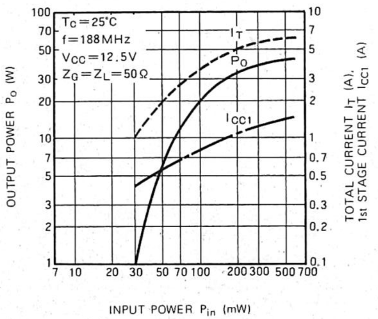
OUTPUT POWER, TOTAL EFFICIENCY, ρ_{in} VS. FREQUENCY CHARACTERISTICS



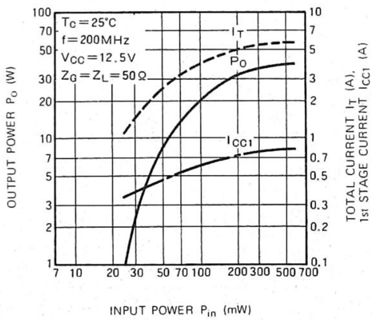
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



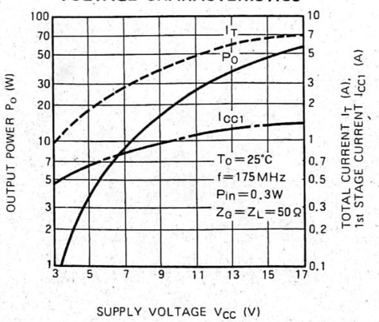
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



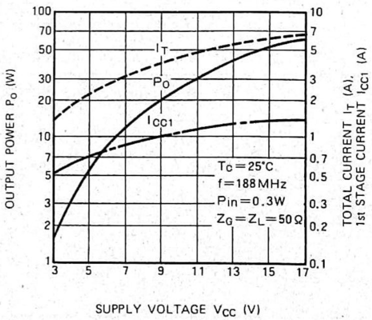
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



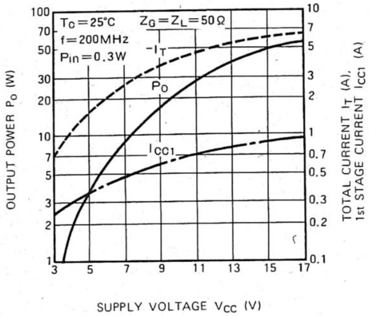
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



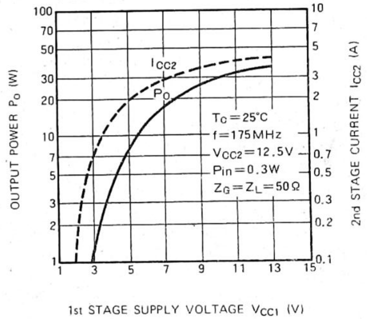
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



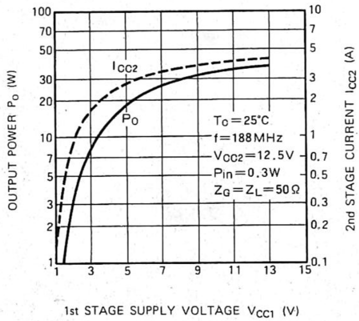
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



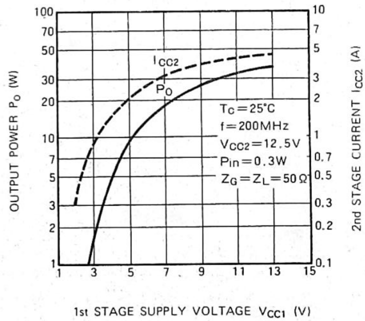
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



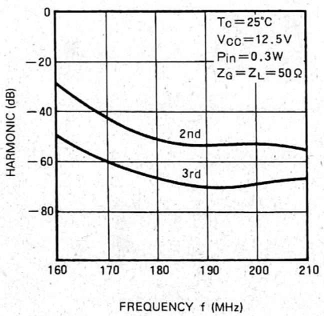
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



DESIGN CONSIDERATION OF HEAT RADIATION

Please refer to following consideration when designing heat sink.

1. Junction temperature of incorporated transistors at standard operation.

(1) Thermal resistance between junction and package of incorporated transistors.

a) First stage transistor

$R_{th(j-c)1} = 8°C/W$ (Typ.)

b) Second stage transistor

$R_{th(j-c)2} = 2°C/W$ (Typ.)

(2) Junction temperature of incorporated transistors at standard operation.

Conditions for standard operation.

$P_o = 30W$, $V_{CC} = 12.5V$, $P_{in} = 0.3W$, $\eta_T = 43\%$ (minimum rating), P_{o1} (Note 1) $= 5W$, $I_T = 5.6A$ (I_{T1} (2) $= 0.9A$, I_{T2} (3) $= 4.7A$)

Note 1: Output power of the first stage transitor

Note 2: Circuit current of the first stage transistor

Note 3: Circuit current of the final stage transistor

Junction temperature of the first stage transistor

$$T_{j1} = (V_{CC} \times I_{T1} - P_{o1} + P_{in}) \times R_{th(j-c)1} + T_C{}^{(4)}$$
$$= (12.5 \times 0.9 - 5 + 0.3) \times 8 + T_C$$
$$= 52 + T_C\ (°C)$$

Note 4: Package temperature of device

Junction temperature of the final stage transistor

$$T_{j2} = (V_{CC} \times I_{T2} - P_o + P_{o1}) \times R_{th(j-c)2} + T_C$$
$$= (12.5 \times 4.7 - 30 + 5) \times 2 + T_C$$
$$= 68 + T_C\ (°C)$$

2. Heat sink design

In thermal design of heat sink, try to keep the package temperature at the upper limit of the operating ambient temperature (normally $T_a = 60°C$) and at the output power of 28W below 90°C.

The thermal resistance $R_{th(j-a)}{}^{(5)}$ of the heat sink to realize this:

$$R_{th(c-a)} = \frac{T_C - T_a}{(P_o/\eta_T) - P_o + P_{in}} = \frac{90 - 60}{(30/0.43) - 30 + 0.3}$$
$$= 0.75\ (°C/W)$$

Note 5: Inclusive of the contact thermal resistance between device and heat sink

Mounting the heat sink of the above thermal resistance on the device.

$T_{j1} = 142°C$, $T_{j2} = 158°C$ at $T_a = 60°C$, $T_C = 90°C$.

In the annual average of ambient temperature is 30°C,

$T_{j1} = 112°C$, $T_{j2} = 128°C$

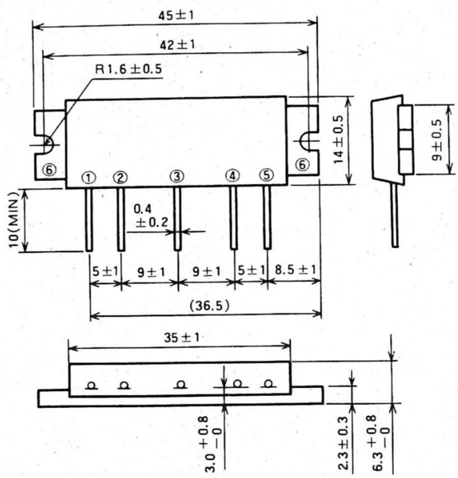
As the maximum junction temperature of these incorporated transistors T_{jmax} are 175°C, application under fully derated condition is ensured.

M67732

1240~1300MHz, 7.2V, 1W, FM PORTABLE RADIO

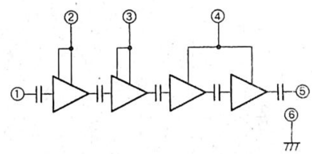
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1,2}$	Supply voltage		9	V
V_{CC3}			16	V
Icc	Total current		1.5	A
$P_{in(max)}$	Input power	$V_{CC1} \leq 8V$, $Z_G = Z_L = 50\,\Omega$	10	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	5	W
$T_{C(OP)}$	Operation case temperature		−20~110	℃
T_{stg}	Storage temperature		−40~110	℃

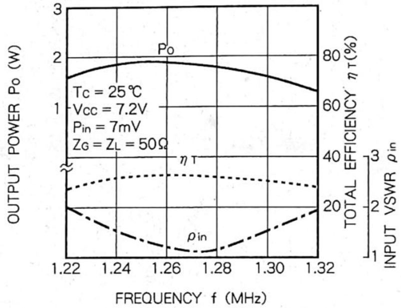
ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = V_{CC3} = 7.2V$ $P_{in} = 7mW$ $Z_G = Z_L = 50\,\Omega$	1240	1300	MHz
Po	Output power		1		W
η_T	Total efficiency		25		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC1} = V_{CC2} = 9V$, $V_{CC3} = 15V$ $P_o = 2W$ (P_{in} : controlled) Load VSWR=10:1(All phase), 5sec. $Z_G = 50\,\Omega$	No degradation		−

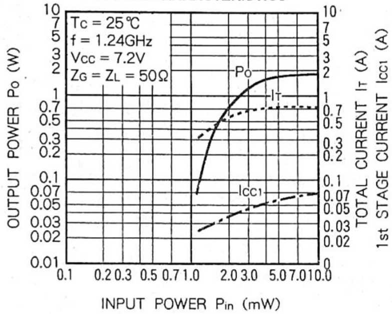
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

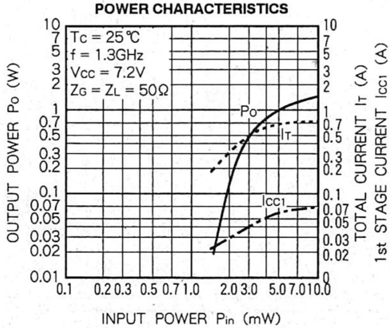
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



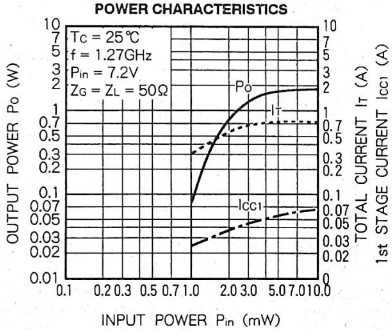
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



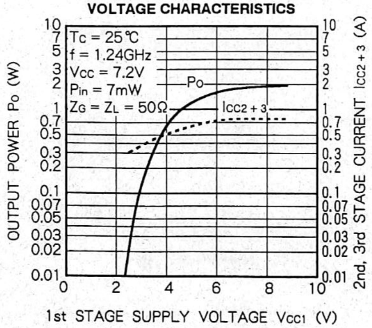
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



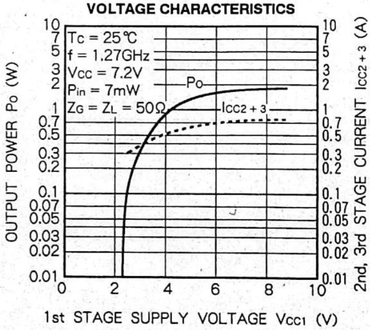
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



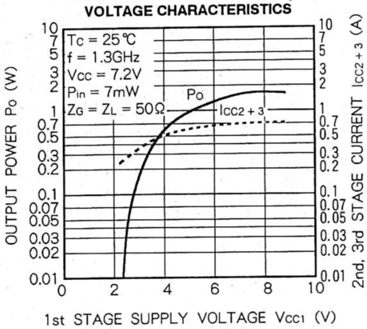
OUTPUT POWER, 2nd, 3rd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



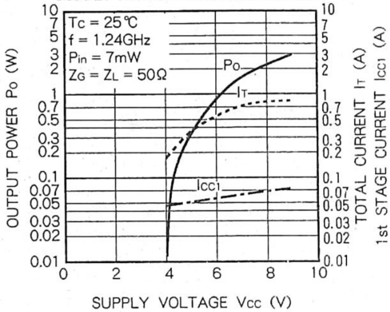
OUTPUT POWER, 2nd, 3rd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



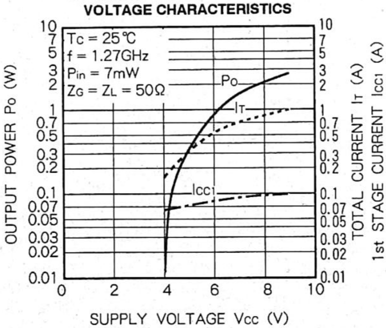
OUTPUT POWER, 2nd, 3rd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



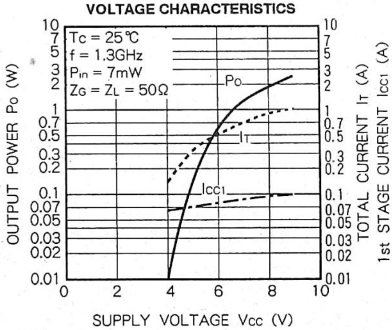
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



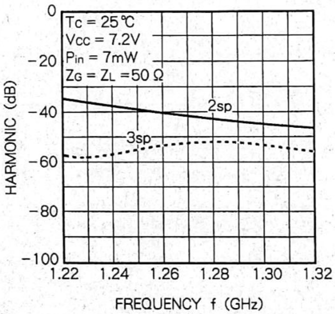
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



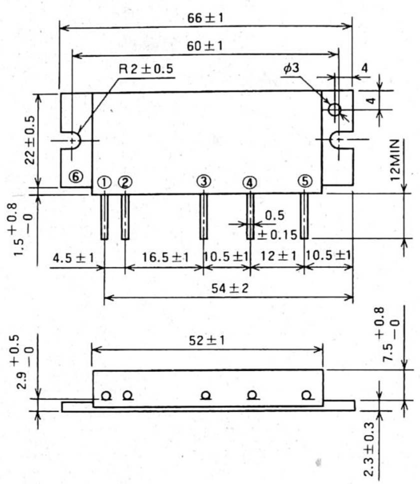
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



M67736

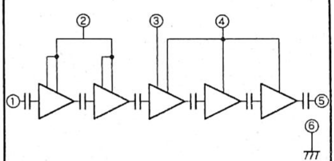
896~941MHz, 12.5V, 12W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS SUPPLY
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		13	V
V_{BB}	Base bias		9	V
V_{CC2}	Supply voltage		17	V
I_{CC}	Total current		5	A
$P_{in(max)}$	Input power	$Z_G=Z_L=50\Omega$, $V_{CC1} \leqq 12.5V$, $V_{BB}=8V$	10	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = 12.5V$ $V_{BB} = 8V$ $P_{in} = 5mW$ $Z_G = Z_L = 50\ \Omega$	896-902, 935-941		MHz
Po	Output power		12		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$P_o = 15W$ (V_{CC1} : controlled) $V_{BB} = 8V$, $V_{CC2} = 15.2V$ $P_{in} = 5mW$, $Z_G = 50\ \Omega$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

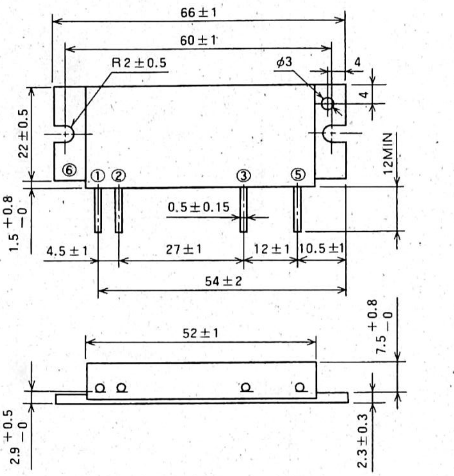
MITSUBISHI ELECTRIC

M67741L

135~160MHz, 12.5V, 30W, FM MOBILE RADIO

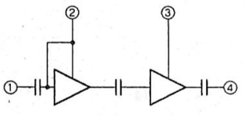
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	35	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

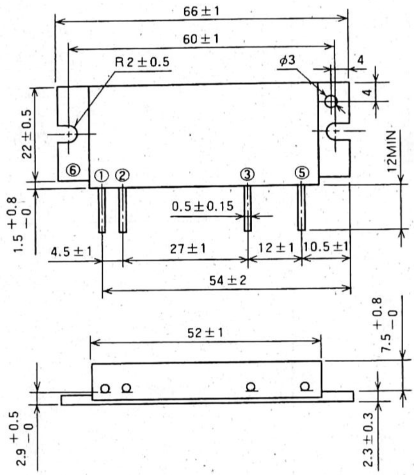
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.2W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	135	160	MHz
P_O	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			3.3	−
−	Load VSWR tolerance	V_{CC}=15.2V, P_O=30W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

M67741H

150~175MHz, 12.5V, 30W, FM MOBILE RADIO

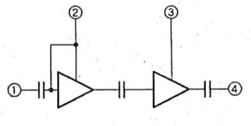
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		17	V
I_{CC}	Total current		7	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.5	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	35	W
$T_{C(OP)}$	Operation case temperature		− 30~110	℃
T_{stg}	Storage temperature		− 40~110	℃

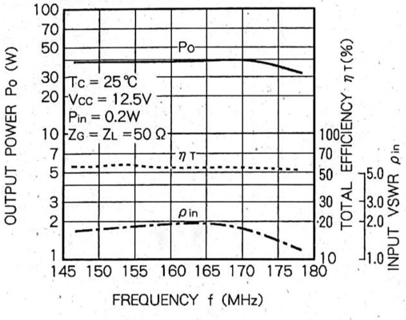
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 0.2W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	150	175	MHz
Po	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			− 25	dB
3fo	3rd. harmonic			− 30	dB
ρ_{in}	Input VSWR			3.3	−
−	Load VSWR tolerance	V_{CC} = 15.2V Po = 30W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

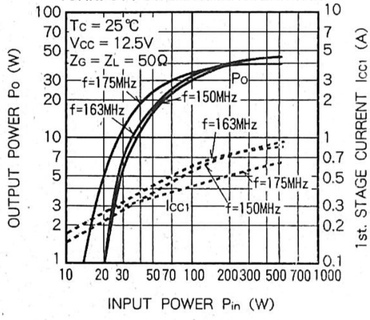
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

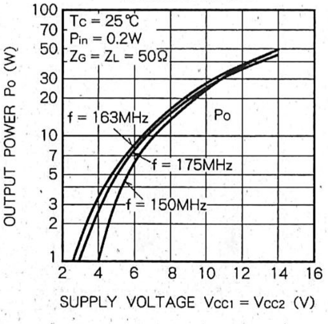
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



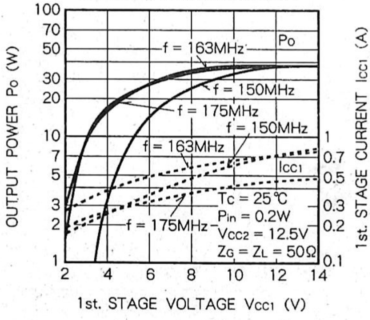
OUTPUT POWER, 1st. STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER VS. 1st STAGE CURRENT CHARACTERISTICS

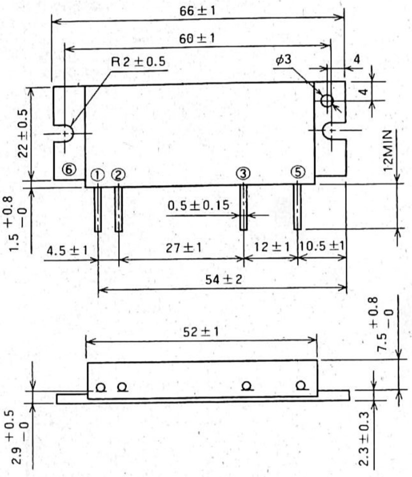


M67742

68~88MHz, 12.5V, 30W, FM MOBILE RADIO

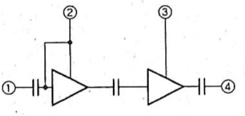
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		17	V
Icc	Total current		10	A
Pin(max)	Input power	ZG = ZL = 50 Ω	0.8	W
Po(max)	Output power	ZG = ZL = 50 Ω	40	W
Tc(OP)	Operation case temperature		−30~110	℃
Tstg	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	Pin = 0.5W Vcc = 12.5V ZG = ZL = 50 Ω	68	88	MHz
Po	Output power		30		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	Vcc = 15.2V, Po = 30W (Pin : controlled) Load VSWR=20:1 (All phase), 2sec. ZG = 50 Ω	No degradation		−

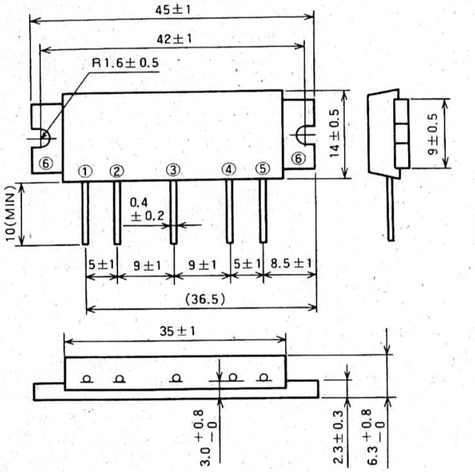
MITSUBISHI ELECTRIC

M67743L

68~81MHz, 12.5V, 7W, FM PORTABLE RADIO

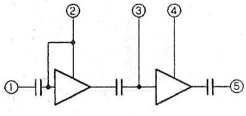
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		15	V
V_{BB}			5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

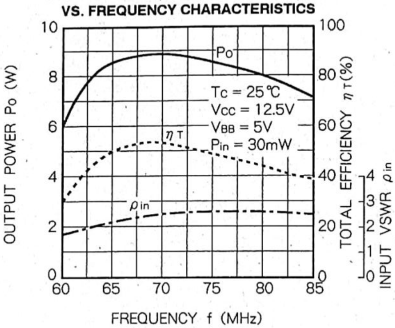
ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 30mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	68	81	MHz
P_o	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−18	dB
3fo	3rd. harmonic			−25	dB
ρ_{in}	Input VSWR			4.0	−
−	Load VSWR tolerance	V_{CC} = 13.2V, V_{BB} = 5V P_o = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

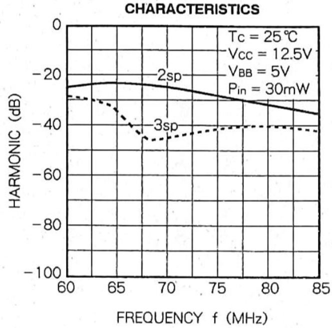
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

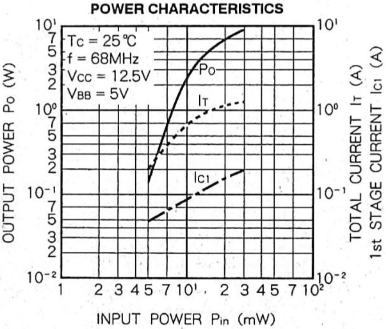
OUTPUT POWER, TOTAL EFFICIENCY, ρin VS. FREQUENCY CHARACTERISTICS



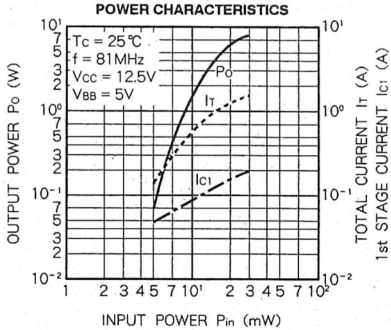
2nd, 3rd HARMONIC VS. FREQUENCY CHARACTERISTICS



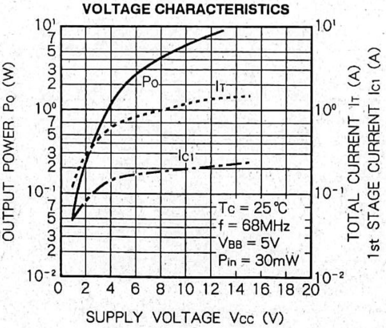
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



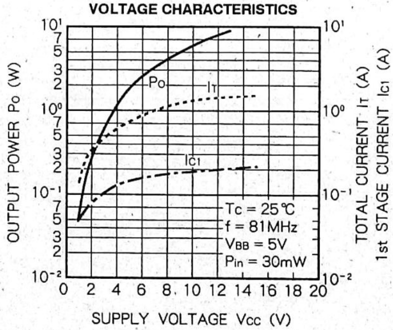
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



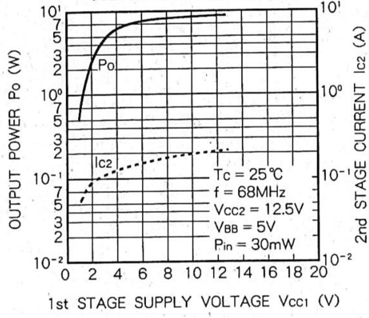
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



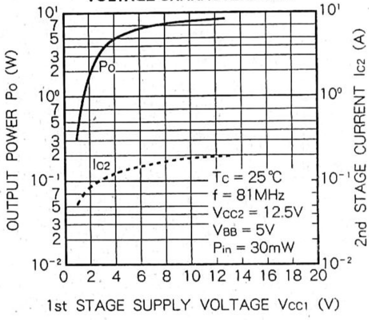
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

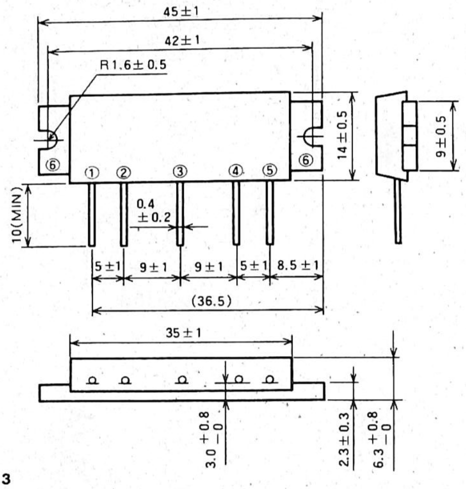


M67743H

77~88MHz, 12.5V, 7W, FM PORTABLE RADIO

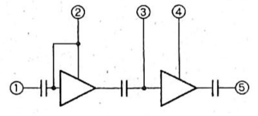
OUTLINE DRAWING

Dimensions in mm



H13

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		15	V
V_{BB}			5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

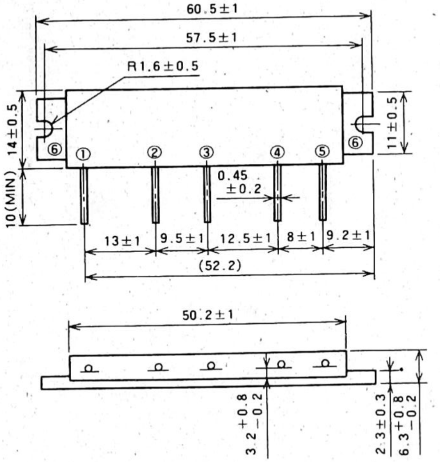
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 30mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	77	88	MHz
Po	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−18	dB
3fo	3rd. harmonic			−25	dB
ρ_{in}	Input VSWR			5.0	−
−	Load VSWR tolerance	V_{CC} = 13.2V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

MITSUBISHI ELECTRIC

M67745

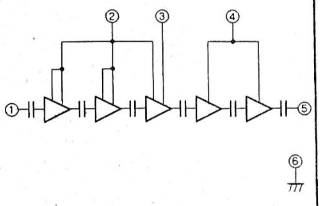
846~903MHz, 12.5V, 7W, FM MOBILE RADIO

OUTLINE DRAWING Dimensions in mm



H11

BLOCK DIAGRAM



PIN:
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

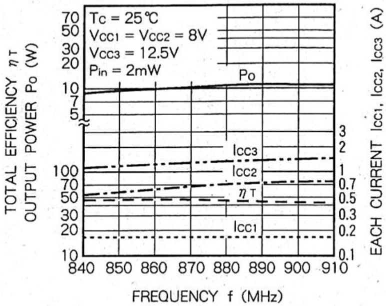
Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1,2}$	Supply voltage		9	V
V_{CC3}			17	V
Icc	Total current		4	A
$P_{in(max)}$	Input power	f=846~903MHz, V_{CC1}≦8V, Z_G=Z_L=50Ω	7	mW
$P_{O(max)}$	Output power	Ditto	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

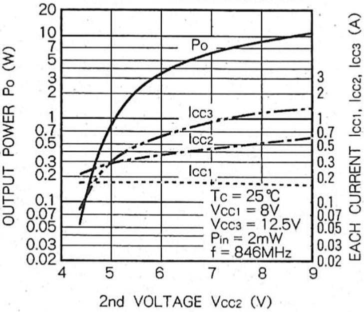
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	V_{CC1} = V_{CC2} = 8V V_{CC3} = 12.5V P_{in} = 2mW Z_G = Z_L = 50 Ω	846	903	MHz
Po	Output power		7		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC1} = 8V, V_{CC3} = 15.2V Po = 7W (V_{CC2} : controlled) P_{in} = 2mW Load VSWR=20:1(All phase), 5sec.	No degradation		−

TYPICAL PERFORMANCE DATA

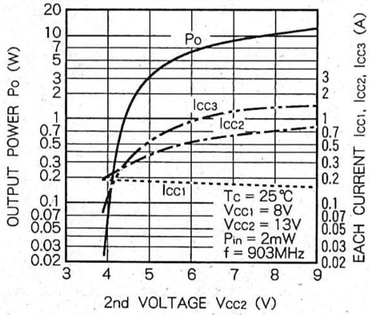
TOTAL EFFICIENCY, OUTPUT POWER, EACH CURRENT VS. FREQUENCY CHARACTERISTICS



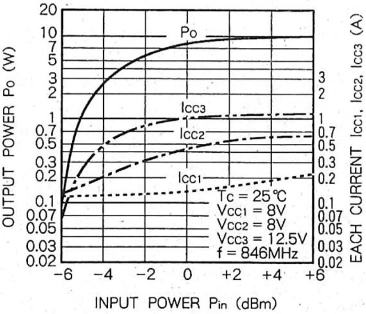
OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS



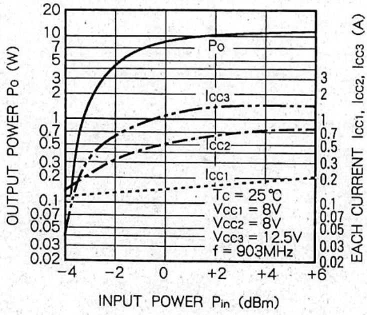
OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. 2nd STAGE VOLTAGE CHARACTERISTICS

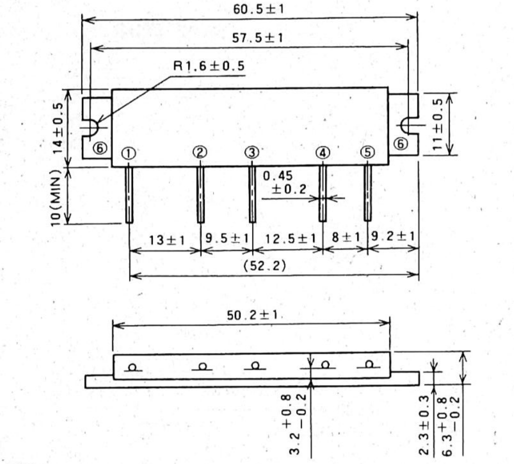


M67747A

898~925MHz, 12.5V, 7W, FM MOBILE RADIO

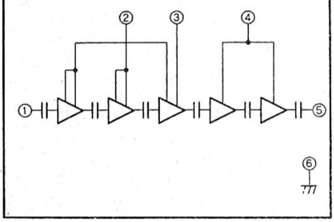
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

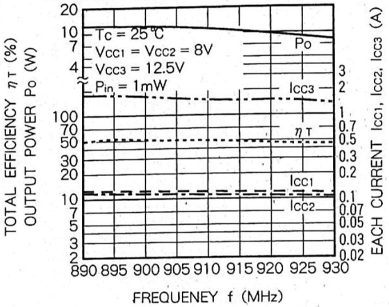
Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1,2}$	Supply voltage		9	V
V_{CC3}			17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	f=846~925MHz, $V_{CC1}\leq$8V, $Z_G=Z_L=50\,\Omega$	10	mW
$P_{o(max)}$	Output power	Ditto	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

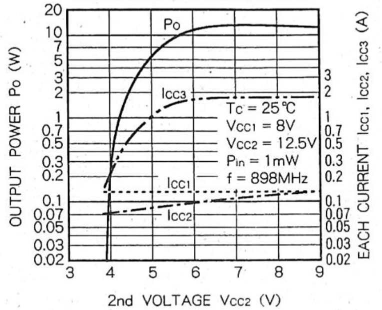
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1}=V_{CC2}=8V$, $V_{CC3}=12.5V$	898	925	MHz
Po	Output power	$P_{in}=1mW$, $Z_G=Z_L=50\,\Omega$	7		W
η_T	Total efficiency	V_{CC1}=8V, Po=6W(V_{CC2} : controlled)	35		%
2fo	2nd. harmonic	$V_{CC3}=12.5V$, $P_{in}=1mW$		−30	dB
ρ_{in}	Input VSWR	$Z_G=Z_L=50\,\Omega$		2.5	—
−	Load VSWR tolerance	$V_{CC1}=8V$, $V_{CC3}=15.2V$ Po = 6W(V_{CC2} : controlled) $P_{in}=1mW$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

TYPICAL PERFORMANCE DATA

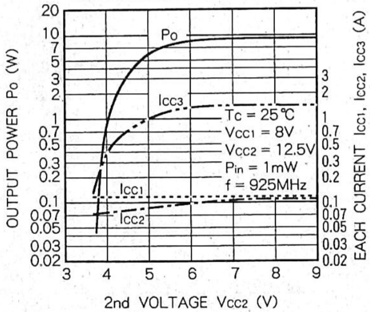
TOTAL EFFICIENCY, OUTPUT POWER, EACH CURRENT VS. FREQUENCY CHARACTERISTICS



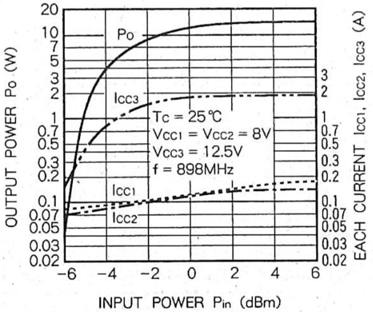
OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS



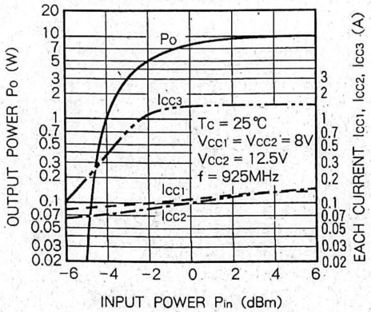
OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS

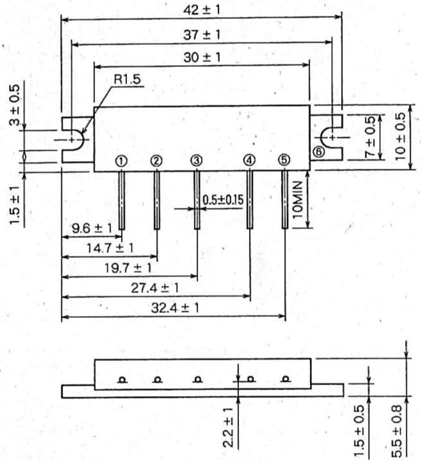


M67748L

135~150MHz, 12.5V, 7W, FM PORTABLE RADIO

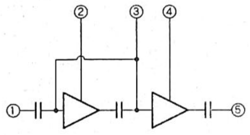
OUTLINE DRAWING

Dimensions in mm



H27

BLOCK DIAGRAM



PIN :
①Po : RF INPUT
②Vcc2 : 2nd. DC SUPPLY
③VBB : BASE BIAS
④Vcc1 : 1st. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		15	V
V_{BB}	Supply voltage		5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

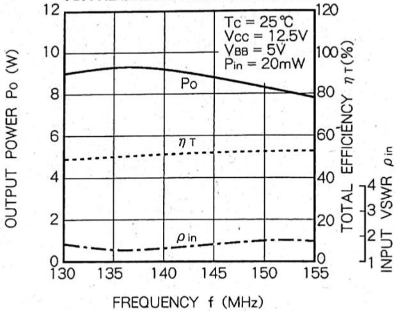
ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 20mW, V_{BB} = 5V, V_{CC} = 12.5V, $Z_G = Z_L = 50\ \Omega$	135	150	MHz
P_O	Output power		7		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−25	dB
ρ_{in}	Input VSWR			2.5	—
–	Load VSWR tolerance	V_{CC2} = 13.2V, V_{BB} = 5V, Po=7W(V_{CC1} : controlled)P_{in}=20mW, Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		–

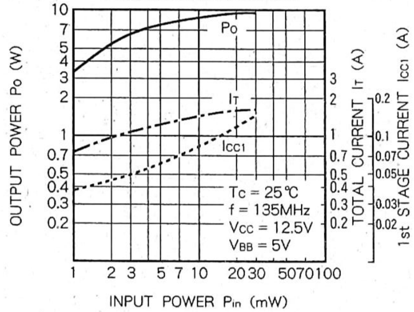
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

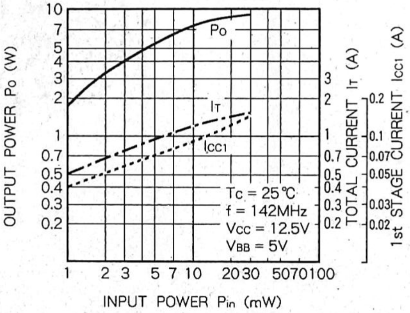
OUTPUT POWER, TOTAL EFFICIENCY, Pin VS. FREQUENCY CHARACTERISTICS



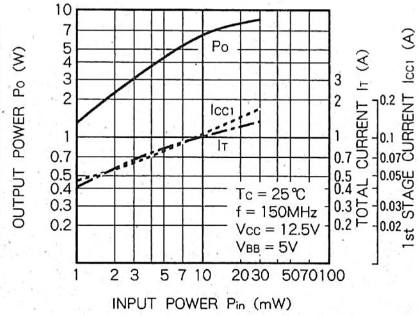
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



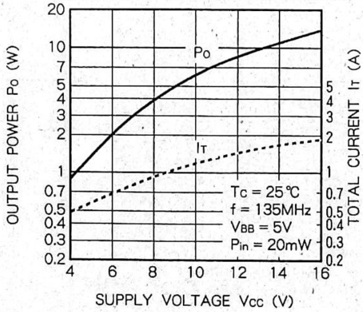
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



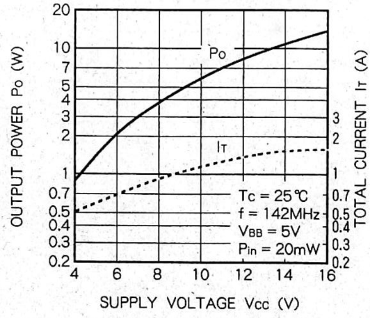
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



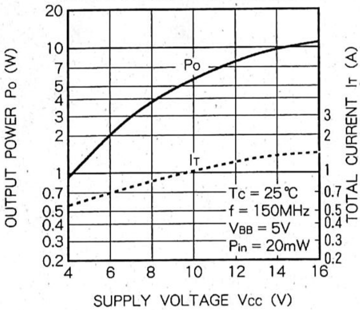
OUTPUT POWER, TOTAL CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



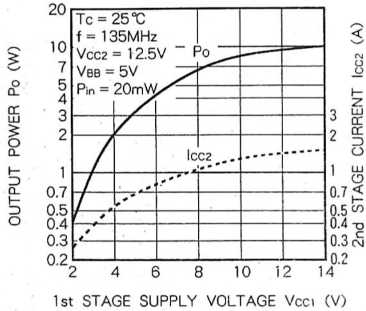
OUTPUT POWER, TOTAL CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



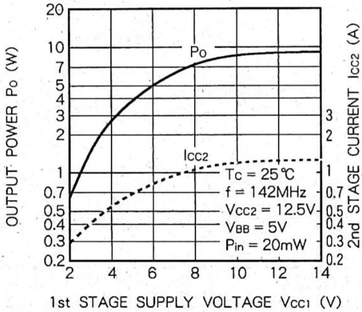
OUTPUT POWER, TOTAL CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



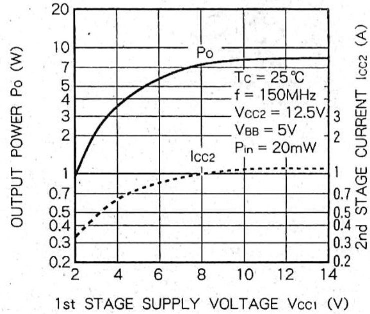
OUTPUT POWER, 2nd STAGE CURRENT, VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT, VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT, VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

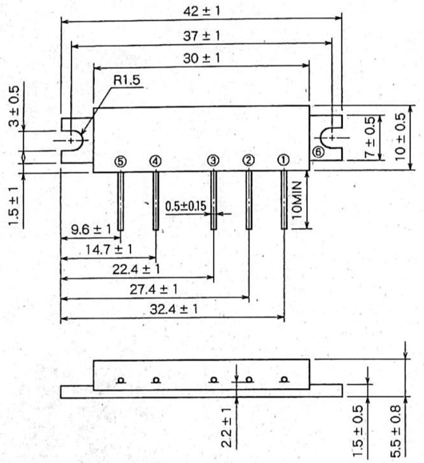


M67748LR

135~150MHz, 12.5V, 7W, FM PORTABLE RADIO

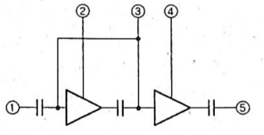
OUTLINE DRAWING

Dimensions in mm



H27R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		15	V
V_{BB}			5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		− 30~110	℃
T_{stg}	Storage temperature		− 40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	135	150	MHz
Po	Output power		7		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			− 20	dB
3fo	3rd. harmonic			− 25	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2} = 13.2V, V_{BB} = 5V Po=7W (V_{CC1}:controlled) P_{in}=20mW Load VSWR=20:1 (All phase), 2sec. Z_G = 50Ω	No degradation		−

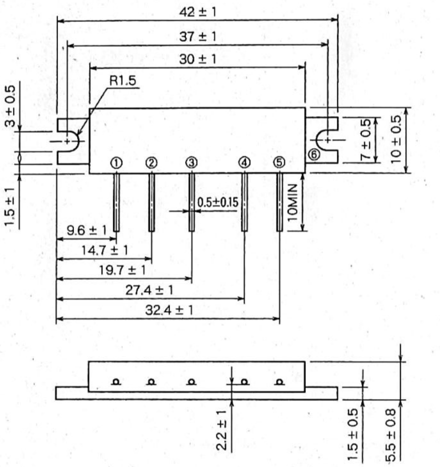
MITSUBISHI ELECTRIC

M67748H

150~174MHz, 12.5V, 7W, FM PORTABLE RADIO

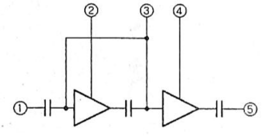
OUTLINE DRAWING

Dimensions in mm



H27

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC2 : 2nd. DC SUPPLY
③VBB : BASE BIAS
④VCC1 : 1st. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		15	V
V_{BB}			5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

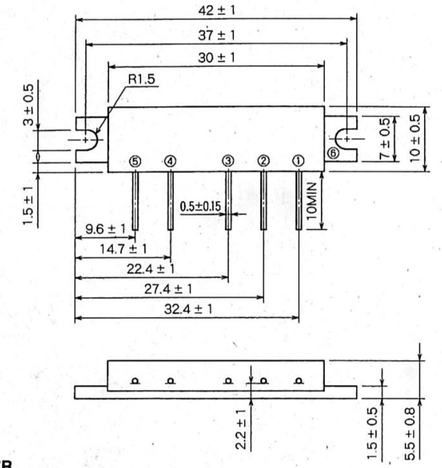
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 20mW$ $V_{BB} = 5V$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	150	174	MHz
Po	Output power		7		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−25	dB
ρ_{in}	Input VSWR			2.5	—
—	Load VSWR tolerance	$V_{CC2} = 13.2V$, $V_{BB} = 5V$ Po=7W(V_{CC1}:controlled) P_{in}=20mW Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		—

M67748HR

150~174MHz, 12.5V, 7W, FM PORTABLE RADIO

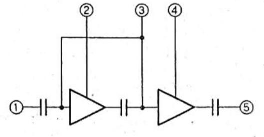
OUTLINE DRAWING

Dimensions in mm



H27R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		15	V
V_{BB}			5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	150	174	MHz
Po	Output power		7		W
η_T	Total efficiency		45		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−25	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2} = 13.2V, V_{BB} = 5V Po=7W (V_{CC1}:controlled) P_{in}=20mW Load VSWR=20:1 (All phase), 2sec. Z_G = 50 Ω	No degradation		−

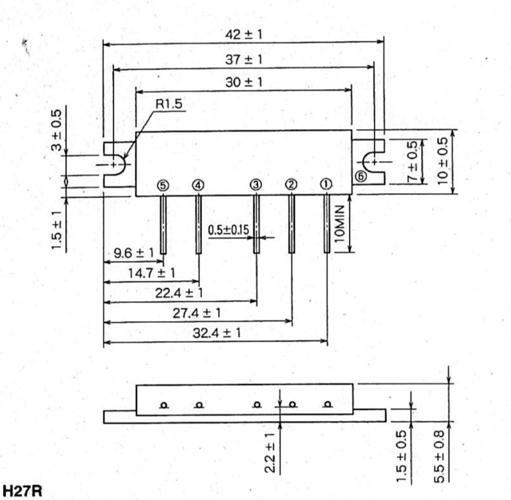
MITSUBISHI ELECTRIC

M67749SLR

335~360MHz, 12.5V, 7W, FM PORTABLE RADIO

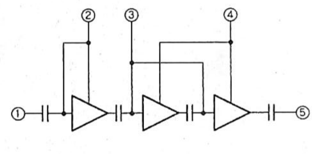
OUTLINE DRAWING

Dimensions in mm



H27R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		− 30~110	℃
T_{stg}	Storage temperature		− 40~110	℃

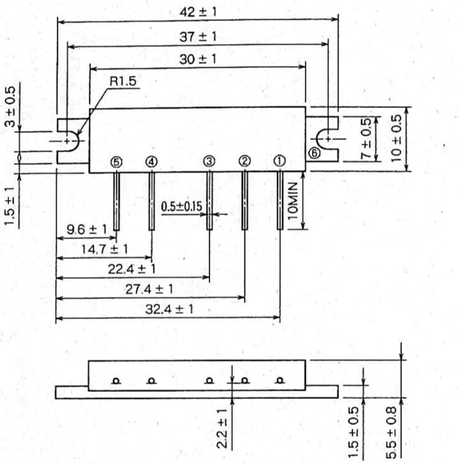
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	335	360	MHz
Po	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			− 25	dB
3fo	3rd. harmonic			− 30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2} = 13.2V, V_{BB} = 5V P_{in} = 20mW Po = 7W (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

M67749ULR

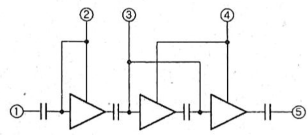
360~390MHz, 12.5V, 7W, FM PORTABLE RADIO

OUTLINE DRAWING Dimensions in mm



H27R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\,\Omega$	360	390	MHz
Po	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2}=13.2V, V_{BB}=5V, P_{in} = 20mW Po = 7W (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

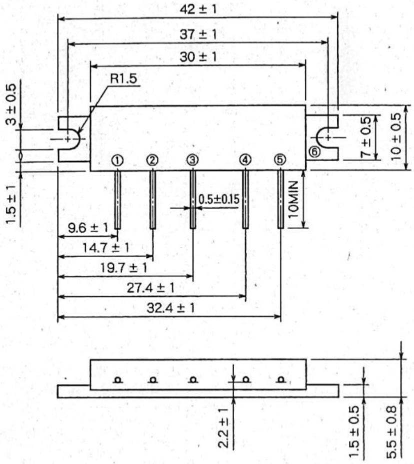
MITSUBISHI ELECTRIC

M67749L

400~430MHz, 12.5V, 7W, FM PORTABLE RADIO

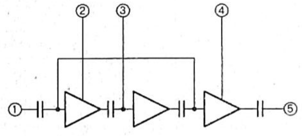
OUTLINE DRAWING

Dimensions in mm



H27

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1nd. DC SUPPLY
③VBB : BASE BIAS
④Vcc2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

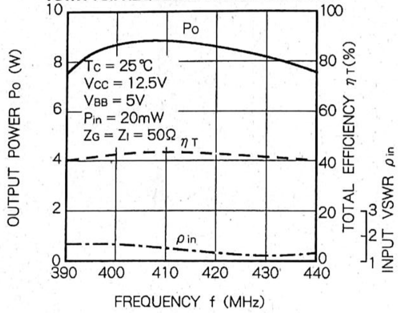
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

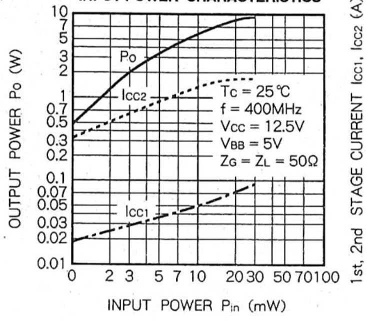
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 20mW$ $V_{BB} = 5V$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	400	430	MHz
Po	Output power		7		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	—
—	Load VSWR tolerance	$V_{CC2} = 13.2V$, $V_{BB} = 5V$ $P_{in} = 20mW$ $P_O = 7W$ (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		—

TYPICAL PERFORMANCE DATA

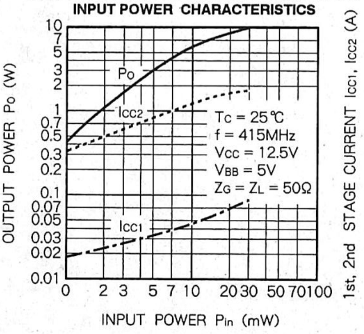
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS.FREQUENCY CHARACTERISTICS



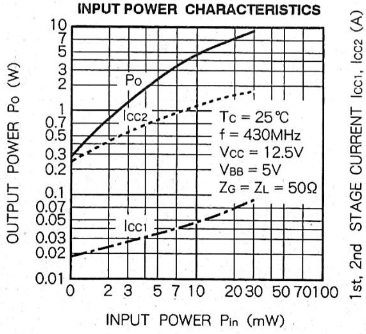
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



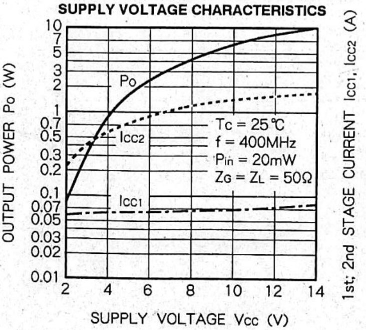
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



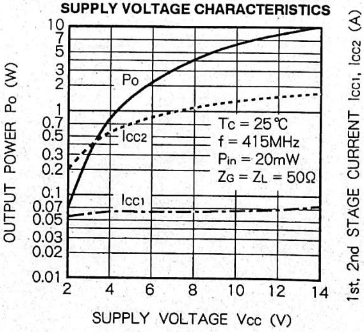
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



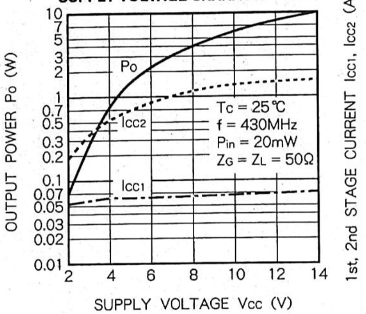
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



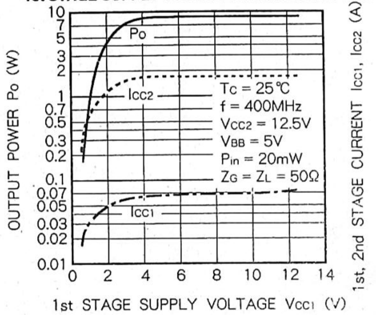
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



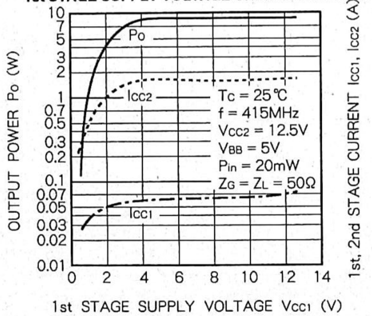
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



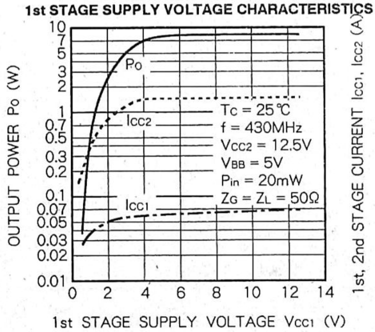
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

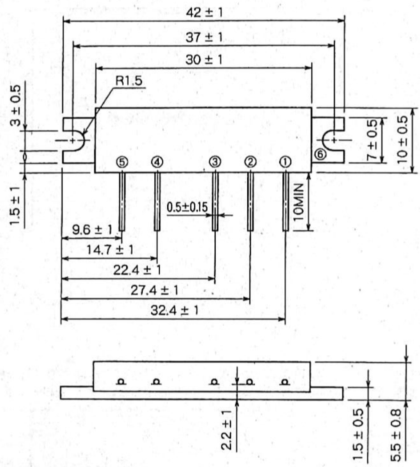


M67749LR

400~430MHz, 12.5V, 7W, FM PORTABLE RADIO

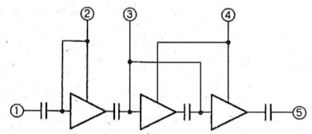
OUTLINE DRAWING

Dimensions in mm



H27R

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② V_{CC1} : 1st. DC SUPPLY
③ V_{BB} : BASE BIAS
④ V_{CC2} : 2nd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	400	430	MHz
Po	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2}=13.2V, V_{BB}=5V, P_{in} = 20mW Po = 7W (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

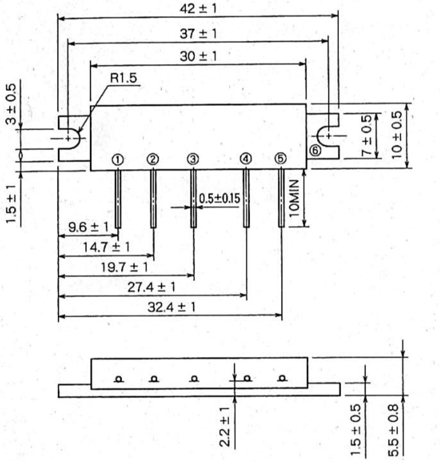
MITSUBISHI ELECTRIC

M67749M

430~450MHz, 12.5V, 7W, FM PORTABLE RADIO

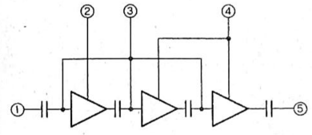
OUTLINE DRAWING

Dimensions in mm



H27

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② Vcc1 : 1st. DC SUPPLY
③ VBB : BASE BIAS
④ Vcc2 : 2nd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leq 5V$	16	V
V_{BB}		$V_{CC} \leq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 20mW, V_{BB} = 5V, V_{CC} = 12.5V, $Z_G = Z_L = 50\ \Omega$	430	450	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2}=13.2V, V_{BB}=5V, P_{in} = 20mW, Po = 7W (V_{CC1} : controlled), Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

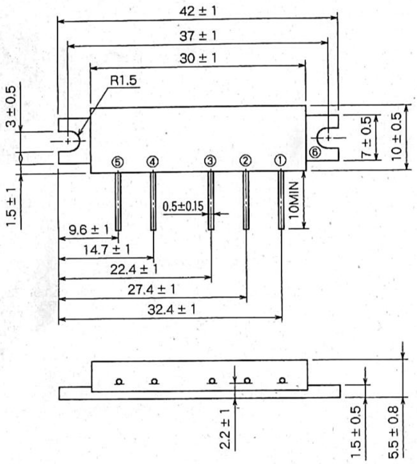
MITSUBISHI ELECTRIC

M67749MR

430~450MHz, 12.5V, 7W, FM PORTABLE RADIO

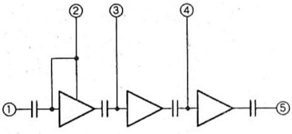
OUTLINE DRAWING

Dimensions in mm



H27R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{BB} : BASE BIAS
④V_{CC2} : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		− 30~110	℃
T_{stg}	Storage temperature		− 40~110	℃

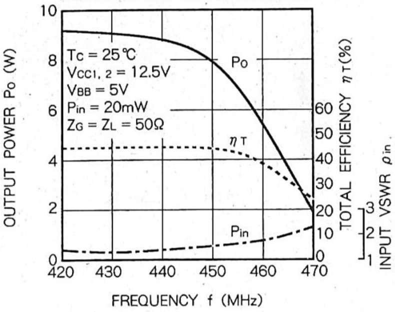
ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	430	450	MHz
Po	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			− 25	dB
3fo	3rd. harmonic			− 30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2} = 13.2V, V_{BB} = 5V, P_{in} = 20mW Po = 7W (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		−

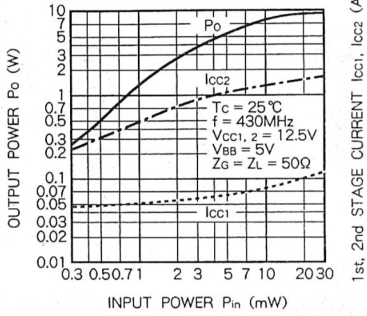
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

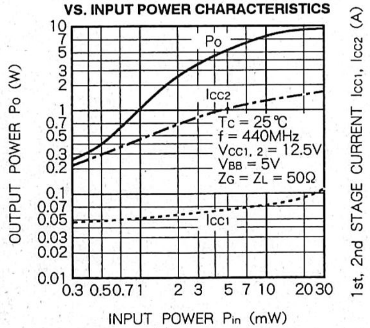
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



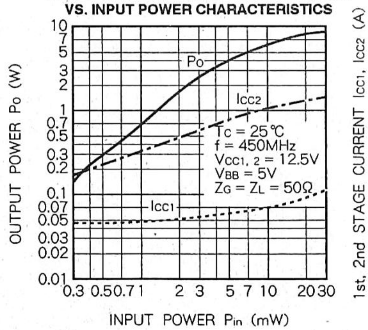
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



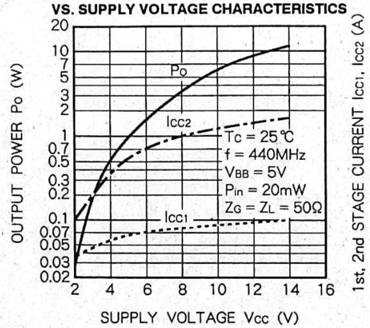
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



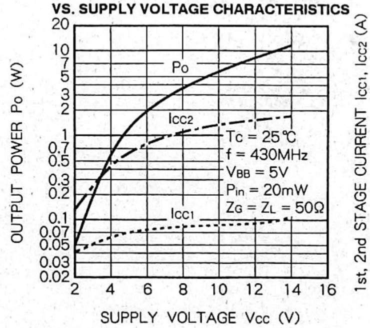
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



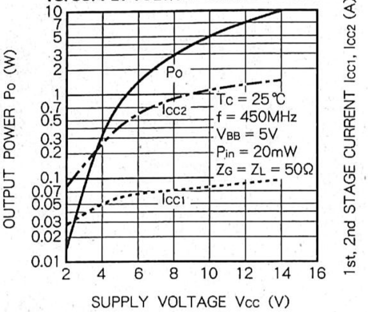
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



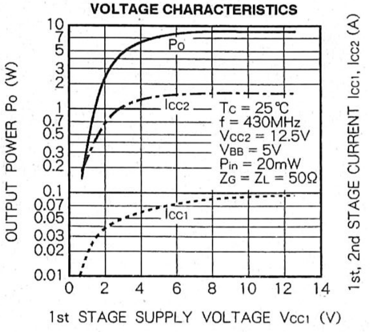
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



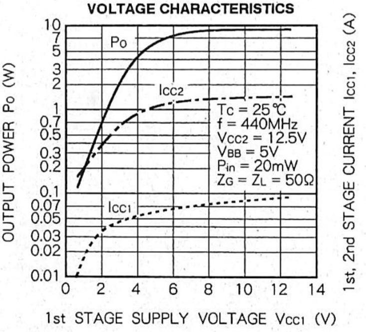
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



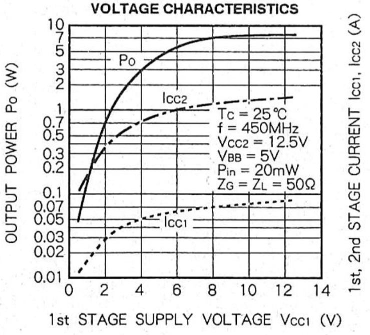
OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 1st, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

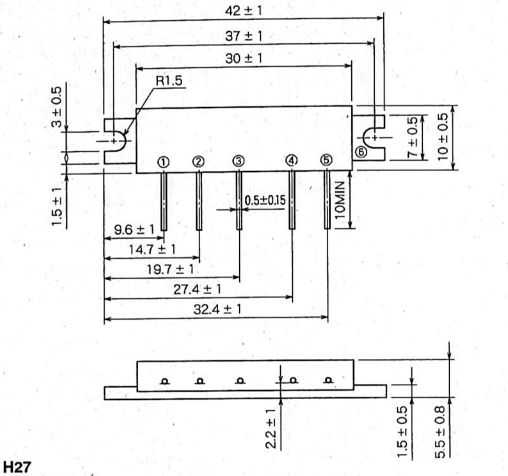


M67749H

440~470MHz, 12.5V, 7W, FM PORTABLE RADIO

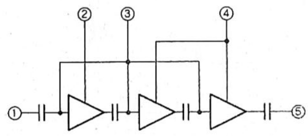
OUTLINE DRAWING

Dimensions in mm



H27

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④Vcc2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS ($T_C = 25$℃ unless otherwise noted)

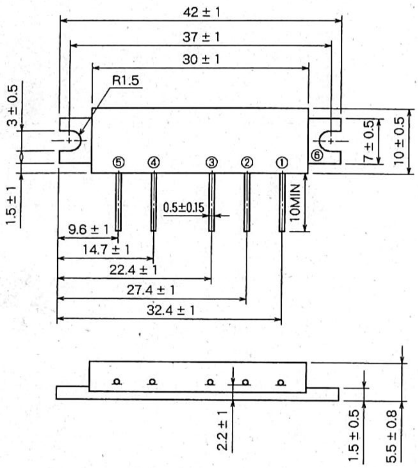
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range		440	470	MHz
Po	Output power	$P_{in} = 20mW$ $V_{BB} = 5V$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC2} = 13.2V$, $V_{BB} = 5V$, $P_{in} = 20mW$ $P_O = 7W$ (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\Omega$	No degradation		−

MITSUBISHI ELECTRIC

M67749HR

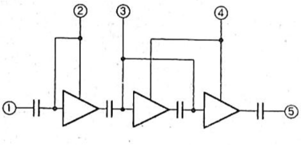
440~470MHz, 12.5V, 7W, FM PORTABLE RADIO

OUTLINE DRAWING Dimensions in mm



H27R

BLOCK DIAGRAM



PIN :
① P_{in} : RF INPUT
② V_{CC1} : 1st. DC SUPPLY
③ V_{BB} : BASE BIAS
④ V_{CC2} : 2nd. DC SUPPLY
⑤ P_O : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leq 5V$	16	V
V_{BB}		$V_{CC} \leq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	40	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\,\Omega$	440	470	MHz
Po	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2}=13.2V, V_{BB}=5V, P_{in} = 20mW Po = 7W (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

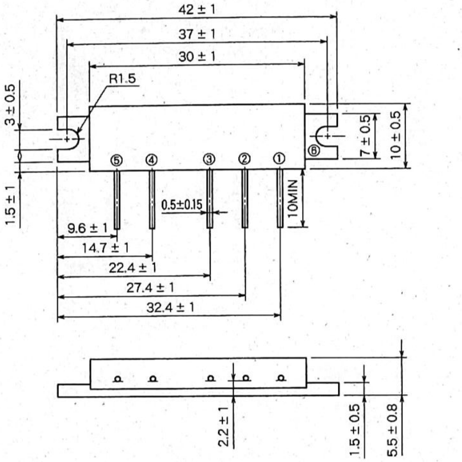
MITSUBISHI ELECTRIC

M67749UHR

470~490MHz, 12.5V, 7W, FM PORTABLE RADIO

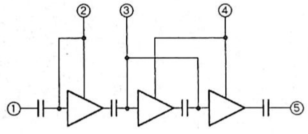
OUTLINE DRAWING

Dimensions in mm



H27R

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④Vcc2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	$V_{BB} \leqq 5V$	16	V
V_{BB}		$V_{CC} \leqq 12.5V$	6	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	40	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 20mW V_{BB} = 5V V_{CC} = 12.5V $Z_G = Z_L = 50\,\Omega$	470	490	MHz
Po	Output power		7		W
η_T	Total efficiency		38		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2}=13.2V, V_{BB}=5V, P_{in} = 20mW Po = 7W (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50Ω	No degradation		−

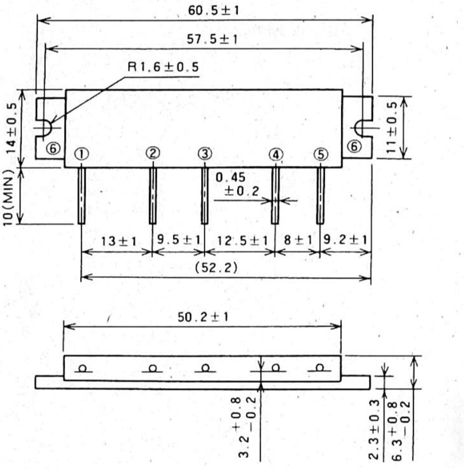
MITSUBISHI ELECTRIC

M67754

824~849MHz, 12.5V, 6W, FM MOBILE RADIO

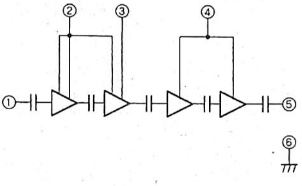
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1,2}$	Supply voltage		9	V
V_{CC3}	Supply voltage		17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	f=824~849MHz, V_{CC1}≦8V, $Z_G=Z_L=50\Omega$	10	mW
$P_{O(max)}$	Output power	Ditto	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

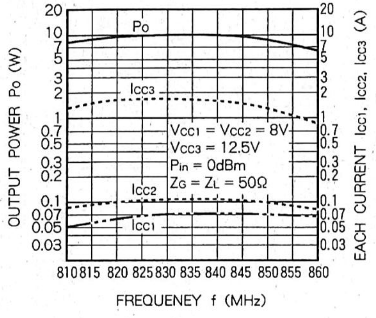
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	V_{CC1} = V_{CC2} = 8V, V_{CC3} = 12.5V P_{in} = 1mW, $Z_G = Z_L = 50\ \Omega$	824	849	MHz
Po	Output power		6		W
η_T	Total efficiency	V_{CC1} = 8V, Po = 6W(V_{CC2} : controlled) V_{CC3} = 12.5V, P_{in} = 1mW $Z_G = Z_L = 50\ \Omega$	35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC1} = 8V, V_{CC3} = 15.2V Po = 6W(V_{CC2} : controlled) P_{in} = 1mW Load VSWR=20:1(All phase), 5sec.	No degradation		−

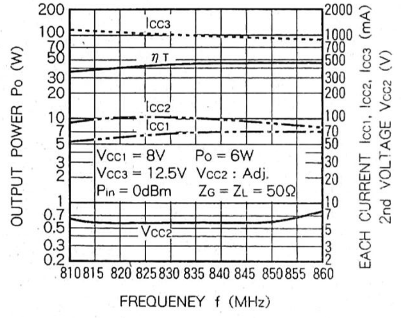
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

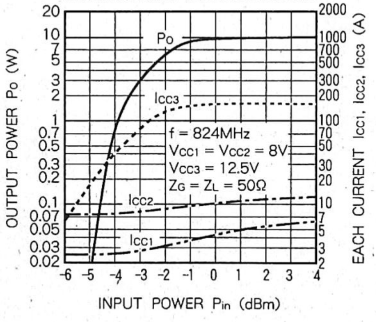
OUTPUT POWER, EACH CURRENT VS. FREQUENCY CHARACTERISTICS



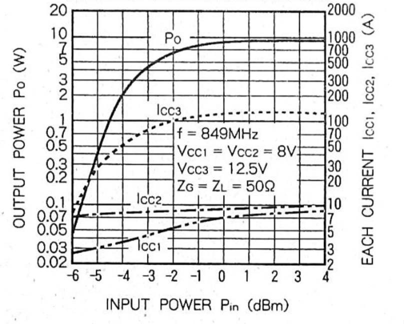
TOTAL EFFICIENCY, EACH CURRENT 2nd VOLTAGE VS. FREQUENCY CHARACTERISTICS



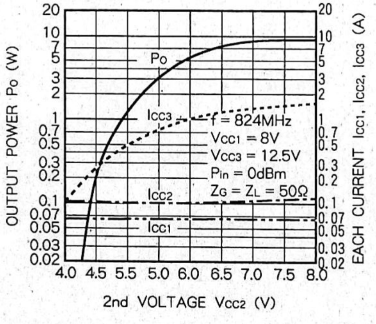
OUTPUT POWER, EACH CURRENT VS. FREQUENCY CHARACTERISTICS



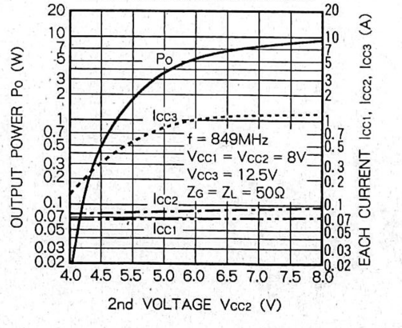
OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS



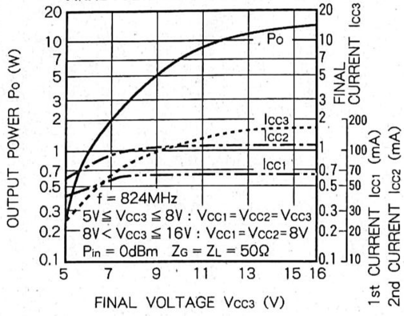
OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS



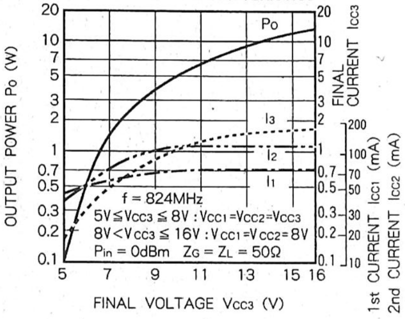
OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH CURRENT VS. FINAL VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH CURRENT VS. FINAL VOLTAGE CHARACTERISTICS

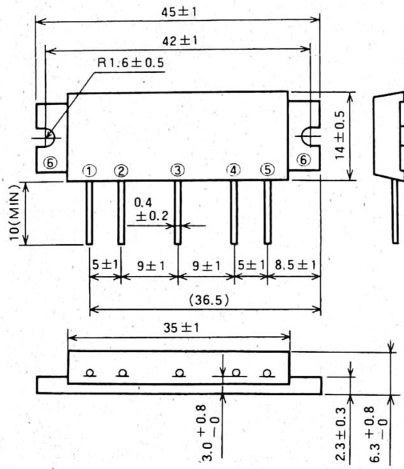


M67755L

134~150MHz, 7.2V, 7W, FM PORTABLE RADIO

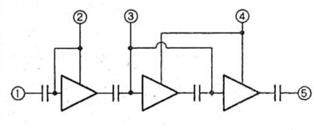
OUTLINE DRAWING

Dimensions in mm



H12

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		10	V
V_{BB}			7	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	4	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 2mW V_{BB} = 5V V_{CC} = 7.2V $Z_G = Z_L = 50\ \Omega$	134	150	MHz
Po	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			3.5	−
−	Load VSWR tolerance	V_{CC} = 9V, V_{BB} = 5V Po = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

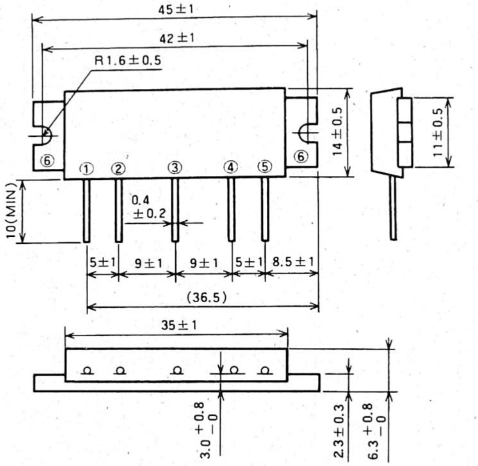
MITSUBISHI ELECTRIC

M67755H

150~174MHz, 7.2V, 7W, FM PORTABLE RADIO

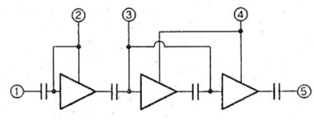
OUTLINE DRAWING

Dimensions in mm



H12

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		9.2	V
V_{BB}	Supply voltage		5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\,\Omega$	4	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\,\Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 2mW, V_{BB} = 5V, V_{CC} = 7.2V, $Z_G = Z_L = 50\,\Omega$	150	174	MHz
P_O	Output power		7		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−25	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			3.5	−
−	Load VSWR tolerance	V_{CC} = 9V, V_{BB} = 5V P_O = 7W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\,\Omega$	No degradation		−

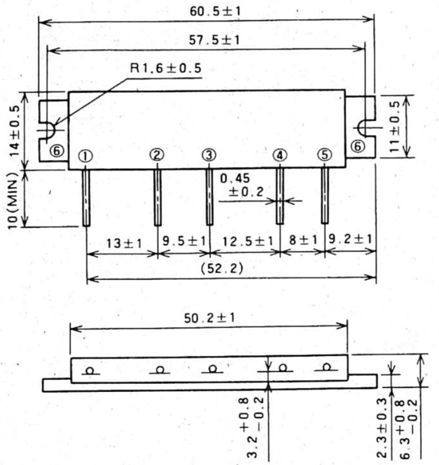
MITSUBISHI ELECTRIC

M67759

872~905MHz, 12.5V, 6W, FM MOBILE RADIO

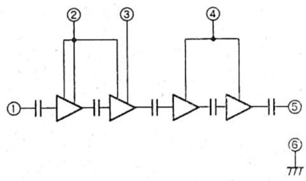
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1,2}$	Supply voltage		9	V
V_{CC3}			17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	f=872~905MHz, $V_{CC1} \leqq 8V$, $Z_G=Z_L=50\Omega$	10	mW
$P_{O(max)}$	Output power	Ditto	10	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

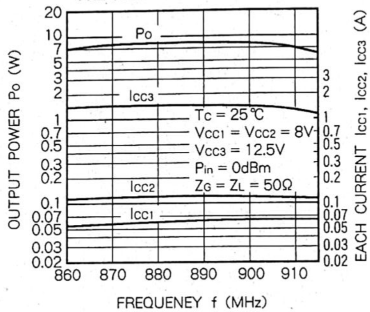
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = 8V$, $V_{CC3} = 12.5V$	872	905	MHz
Po	Output power	$P_{in} = 1mW$, $Z_G = Z_L = 50\Omega$	6		W
η_T	Total efficiency	$V_{CC1}=8V$, $P_O=6W$ (V_{CC2} : controlled)	35		%
2fo	2nd. harmonic	$V_{CC3} = 12.5V$, $P_{in} = 1mW$,		−30	dB
ρ_{in}	Input VSWR	$Z_G = Z_L = 50\Omega$		2.5	−
−	Load VSWR tolerance	$V_{CC1} = 8V$, $V_{CC3} = 15.2V$, $P_O = 6W$ (V_{CC2} : controlled) $P_{in} = 1mW$ Load VSWR=20:1(All phase), 5sec.	No degradation		−

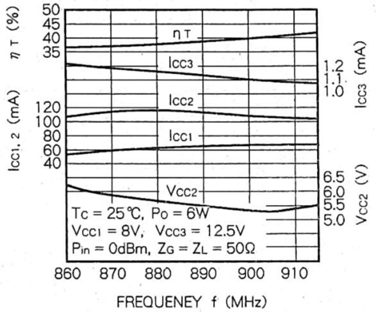
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

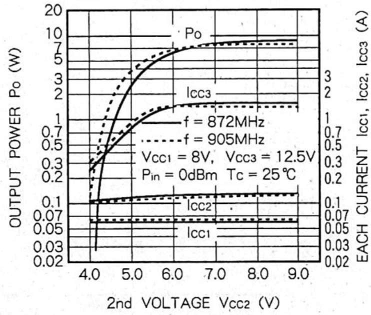
OUTPUT POWER, EACH CURRENT VS. FREQUENCY CHARACTERISTICS



η T, Icc1, Icc2, Icc3, Vcc2 VS. FREQUENCY



OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS

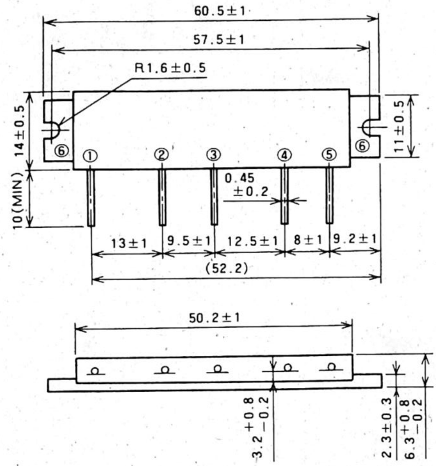


M67761

893~901MHz, 7.2V, 7W, FM PORTABLE RADIO

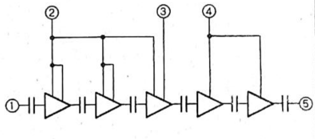
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1,2,3}$	Supply voltage		9, 2	V
I_{CC}	Total current	$Z_G = Z_L = 50\ \Omega$	4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	7	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	9	W
$T_{C(OP)}$	Operation case temperature	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	−30~100	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

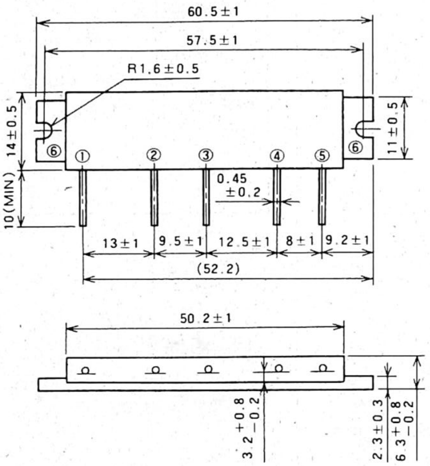
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 1mW, $V_{CC1} = V_{CC2} = V_{CC3} = 7.2V$, $Z_G = Z_L = 50\ \Omega$	893	901	MHz
Po	Output power		7		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dBc
3fo	3rd. harmonic			−30	dBc
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC2} = V_{CC3}$ = 9.2V, Po = 7W (V_{CC1} : controlled), Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation in output power		−

M67764

940~960MHz, 12.5V, 8W, FM MOBILE RADIO

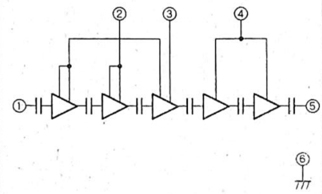
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		9	V
V_{CC2}			14	V
V_{CC3}			17	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 8V$	7	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	12	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

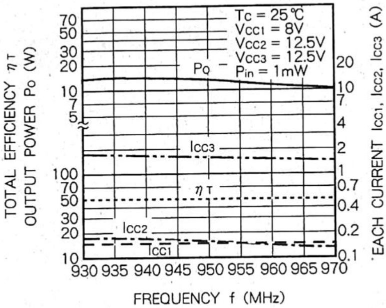
ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	V_{CC1} = 8V $V_{CC2} = V_{CC3}$ = 12.5V P_{in} = 1mW $Z_G = Z_L = 50\ \Omega$	940	960	MHz
Po	Output power		8		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC1} = 8V, V_{CC3} = 15.2V Po = 8W (V_{CC2} : controlled) P_{in} = 1mW Load VSWR=20:1(All phase), 5sec.	No degradation		−

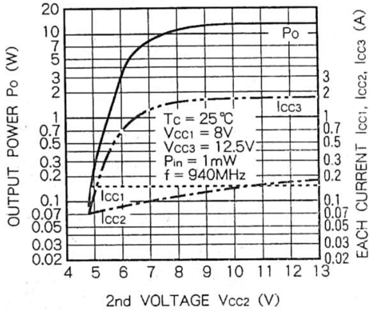
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

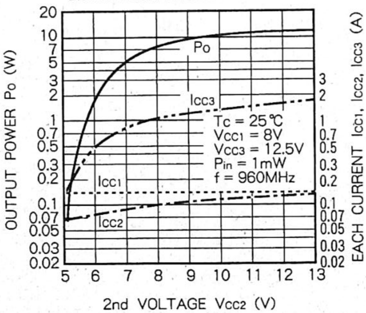
TOTAL EFFICIENCY, OUTPUT POWER, EACH CURRENT VS. FREQUENCY CHARACTERISTICS



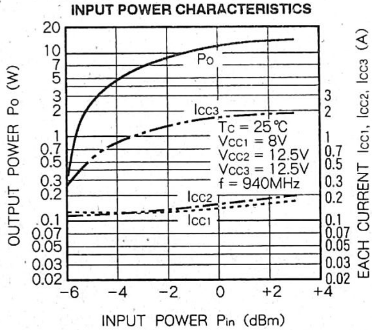
OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS



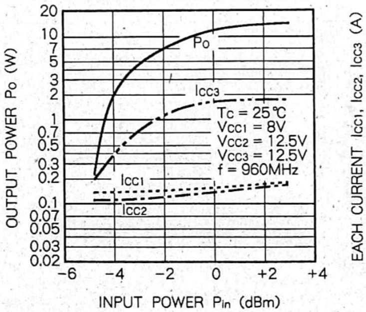
OUTPUT POWER, EACH CURRENT VS. 2nd VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS

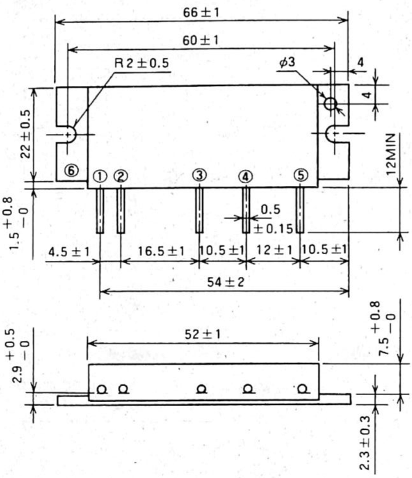


M67766A

824~849MHz, 12.5V, 6.0W, MOBILE RADIO

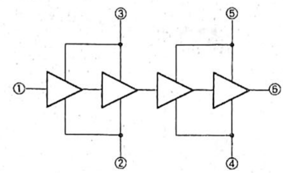
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{BB1} : 1st. BASE BIAS SUPPLY
③V_{CC1} : 1st. COLLECTOR BIAS SUPPLY
④V_{BB2} : 2nd. BASE BIAS SUPPLY
⑤V_{CC2} : 2nd. COLLECTOR BIAS SUPPLY
⑥Po : RF OUTPUT
⑦GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

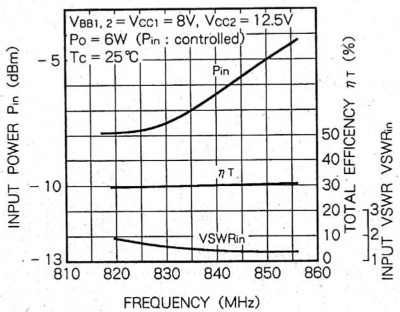
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	1st. Collector bias supply voltage	$Z_G = Z_L = 50\,\Omega$, $V_{BB1} = 8V$	9	V
V_{CC2}	2nd. Collector bias supply voltage	$Z_G = Z_L = 50\,\Omega$, $V_{BB2} = 8V$	17	V
V_{BB1}	1st. Base bias supply voltage	$Z_G = Z_L = 50\,\Omega$, $V_{CC1} = 8V$	9	V
V_{BB2}	2nd. Base bias supply voltage	$Z_G = Z_L = 50\,\Omega$, $V_{CC2} = 12.5V$	9	V
I_{CC1}	1st. Collector DC current	$Z_G = Z_L = 50\,\Omega$	300	mA
I_{CC2}	2nd. Collector DC current	$Z_G = Z_L = 50\,\Omega$	2	A
I_{BB1}	1st. Base DC current	$Z_G = Z_L = 50\,\Omega$	200	mA
I_{BB2}	2nd. Base DC current	$Z_G = Z_L = 50\,\Omega$	300	mA
$P_{i(av)}$	Average input power	$Z_G = Z_L = 50\,\Omega$, $V_{CC2} = 12.5V$	4	mW
$P_{i(pk)}$	Peak input power	$Z_G = Z_L = 50\,\Omega$, $V_{CC2} = 12.5V$	10	mW
$P_{o(av)}$	Average output power	$Z_G = Z_L = 50\,\Omega$, $V_{CC2} = 12.5V$	10	W
$P_{o(pk)}$	Peak output power	$Z_G = Z_L = 50\,\Omega$, $V_{CC2} = 12.5V$	20	W
$T_{C(OP)}$	Operation case temperature	$Z_G = Z_L = 50\,\Omega$	−30~100	℃
T_{stg}	Storage temperature		−30~100	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

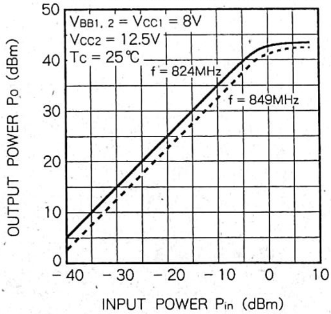
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range		824	849	MHz
$P_{o(pk)}$	Peak output power	$P_{i(pk)}$ = 2mW, V_{BB1} = V_{BB2} = 8V, V_{CC2} = 12.5V, Z_G = Z_L = 50Ω	12.5		W
$P_{i(av)}$	Average output power	V_{BB1} = V_{CC1} = V_{BB2} = 8V, V_{CC2} = 12.5V, P_o = 6.0W (P_{in} : controlled) Z_G = Z_L = 50Ω		1	mW
η_T	Total efficiency		20		%
2fo	2nd. harmonic			− 30	dBc
3fo	3rd. harmonic			− 30	dBc
$VSWR_{in}$	Input VSWR			3 : 1	−
IMD_3	3rd. IMD	V_{BB1}=V_{CC1}=V_{BB2}=8V, V_{CC2}=12.5V, $P_{o(av)}$ = 6.0W (P_{in} : controlled), Δ f = 10kHz, 2 tone, Z_G = Z_L = 50Ω		− 24	dBc
IMD_5	5th. IMD			− 32	dBc
IMD_7	7th. IMD			− 38	dBc
−	Load VSWR tolerance	V_{BB1} = V_{CC1} = V_{BB2} = 8V, V_{CC2} = 15V, P_o = 6.0W (P_{in} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation in output power		−

TYPICAL PERFORMANCE DATA

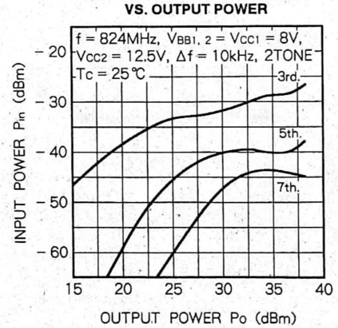
INPUT POWER, TOTAL EFFICENCY, INPUT VSWR VS. FREQUENCY



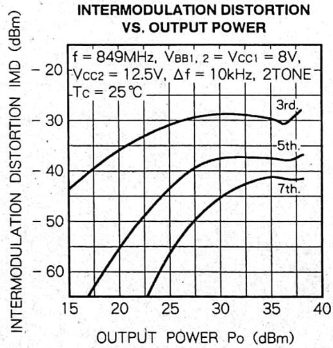
OUTPUT POWER VS. INPUT POWER



INTERMODULATION DISTORTION VS. OUTPUT POWER



INTERMODULATION DISTORTION VS. OUTPUT POWER

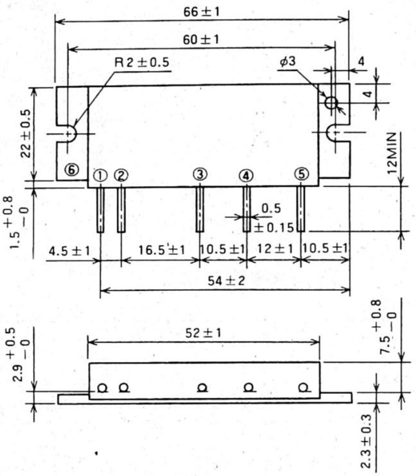


M67769C

890~915MHz, 12.5V, 13W, FM MOBILE RADIO

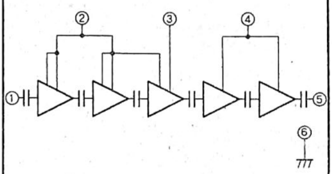
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②V_{CC1} : 1st. DC SUPPLY
③V_{CC2} : 2nd. DC SUPPLY
④V_{CC3} : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

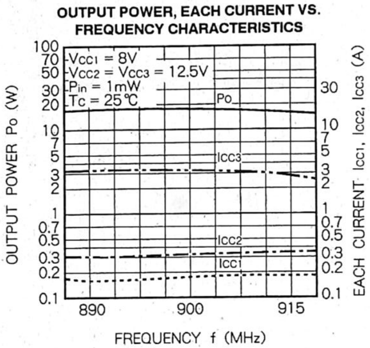
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		9	V
V_{CC2}			15	V
V_{CC3}			17	V
Icc	Total current		5	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 8V$	4	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	20	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

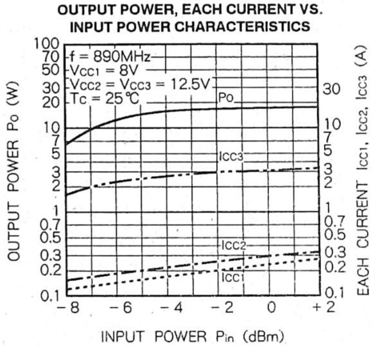
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

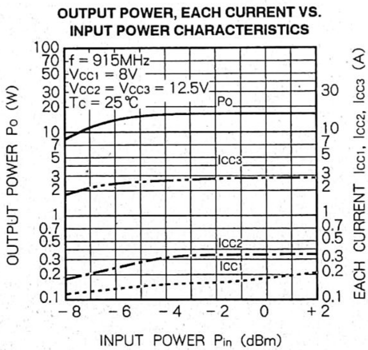
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	V_{CC1} = 8V V_{CC2} = V_{CC3} = 12.5V P_{in} = 1mW $Z_G = Z_L = 50\ \Omega$	890	915	MHz
Po	Output power		13		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	V_{CC1} = 8V, V_{CC3} = 15.2V Po = 13W (V_{CC2} : controlled) P_{in} = 1mW Load VSWR=20:1(All phase), 5sec.	No degradation		−

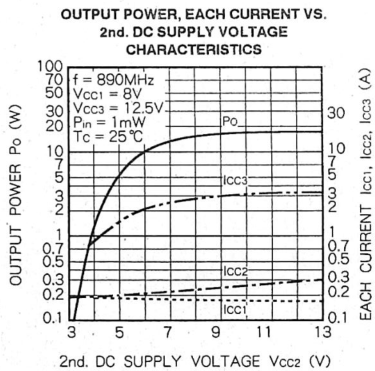
MITSUBISHI ELECTRIC

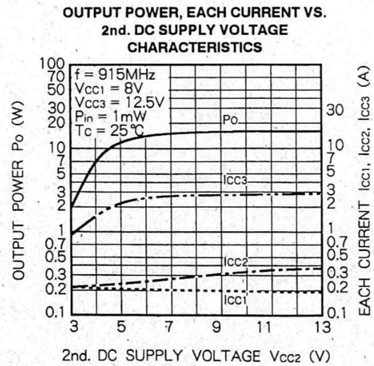
TYPICAL PERFORMANCE DATA

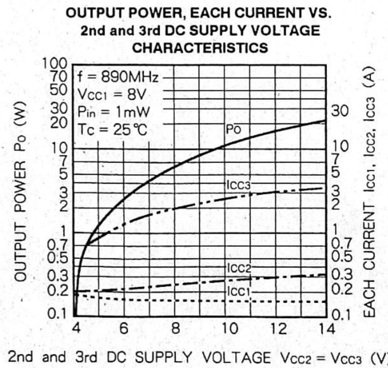




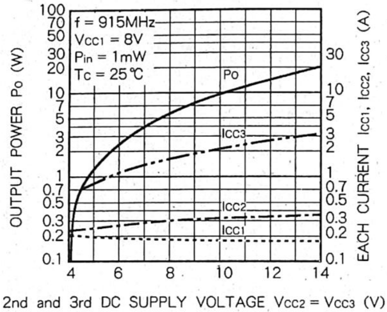








OUTPUT POWER, EACH CURRENT VS. 2nd and 3rd DC SUPPLY VOLTAGE CHARACTERISTICS

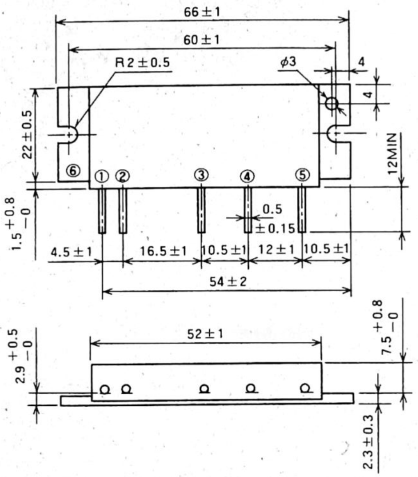


M67775

1465~1477MHz, 13.5V, 7.5W, FM MOBILE RADIO

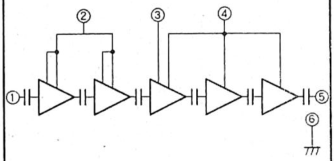
OUTLINE DRAWING

Dimensions in mm



H3

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS DC SUPPLY
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

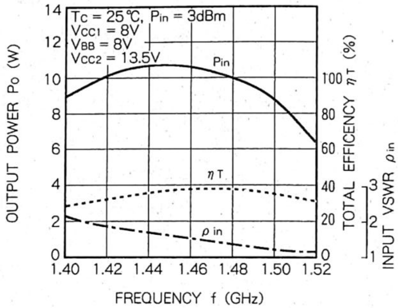
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		9	V
V_{CC2}			16	V
V_{BB}			8.5	V
Icc	Total current		4	A
$P_{in(max)}$	Input power	$V_{CC1} \leqq 8V$, $Z_G = Z_L = 50\ \Omega$	5	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	10	W
$T_{C(OP)}$	Operation case temperature		−30~90	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

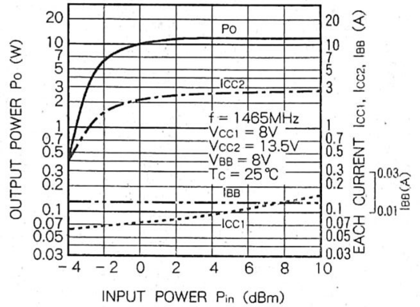
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = 8V$ $V_{BB} = 8V$ $V_{CC2} = 13.5V$ $P_{in} = 2mW$ $Z_G = Z_L = 50\ \Omega$	1465	1477	MHz
Po	Output power		7.5		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−25	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{BB} = 8V$, $V_{CC2} = 15.2V$ Po = 8W (V_{CC1} : controlled) $P_{in} = 2mW$ Load VSWR=10:1(All phase), 5sec.	No degradation		−

TYPICAL PERFORMANCE DATA

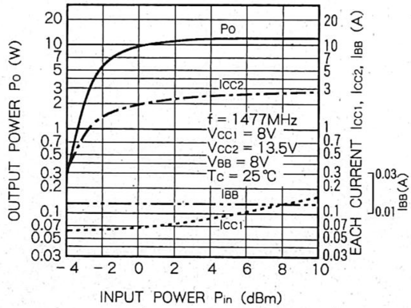
OUTPUT POWER, TOTAL EFFICIENCY VS. FREQUENCY CHARACTERISTICS



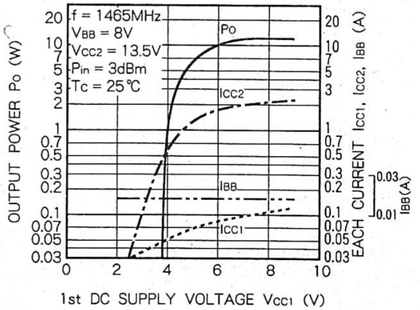
OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS



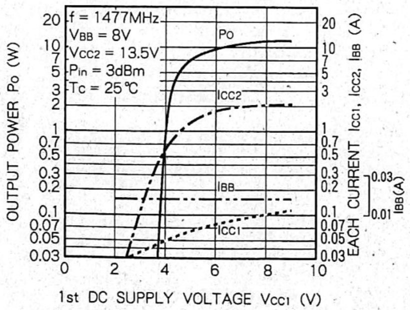
OUTPUT POWER, EACH CURRENT VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER, EACH CURRENT VS. 1st DC SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH CURRENT VS. 1st DC SUPPLY VOLTAGE CHARACTERISTICS

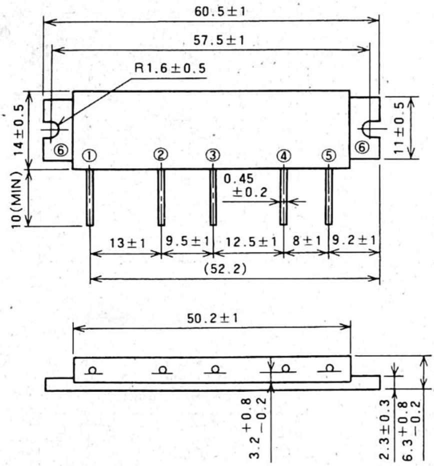


M67776L

806~870MHz, 7.2V, 5.0W, FM PORTABLE RADIO

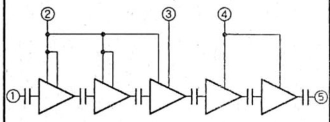
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1, 2, 3}$	Supply voltage		9.2	V
I_{CC}	Total current	$Z_G = Z_L = 50\ \Omega$	4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	4	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	8	W
$T_{C(OP)}$	Operation case temperature	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

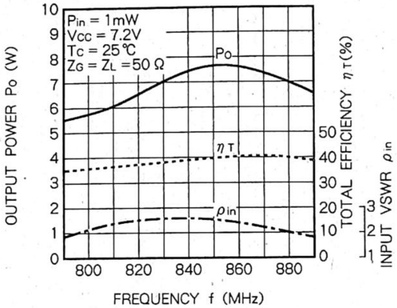
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$P_{in} = 1mW$, $V_{CC1} = V_{CC2} = V_{CC3} = 7.2V$, $Z_G = Z_L = 50\ \Omega$	806	870	MHz
Po	Output power		5		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−30	dBc
3fo	3rd. harmonic			−30	dBc
ρ_{in}	Input VSWR			3.0	−
−	Load VSWR tolerance	$V_{CC2}=V_{CC3}=9.2V$, $P_O=5.0W$ (V_{CC1} controlled), Load VSWR=20:1 (All phase), 2sec. $Z_G = 50\ \Omega$	No degradation in output power		−

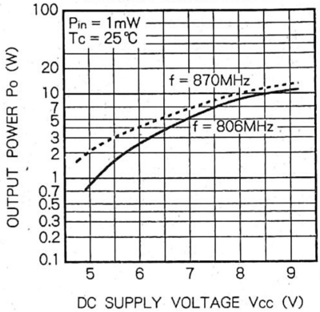
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

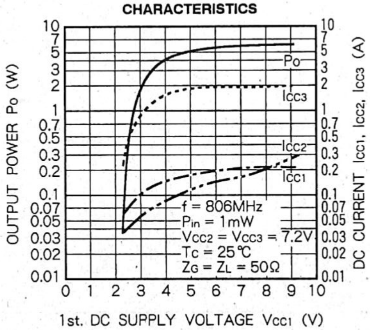
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



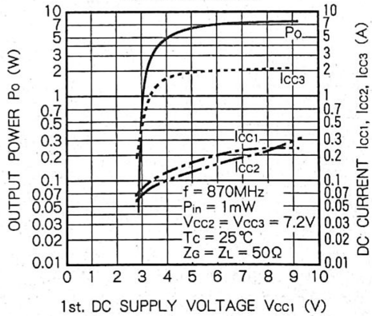
OUTPUT POWER VS. DC SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, DC CURRENT VS. 1st. DC SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, DC CURRENT VS. 1st. DC SUPPLY VOLTAGE CHARACTERISTICS

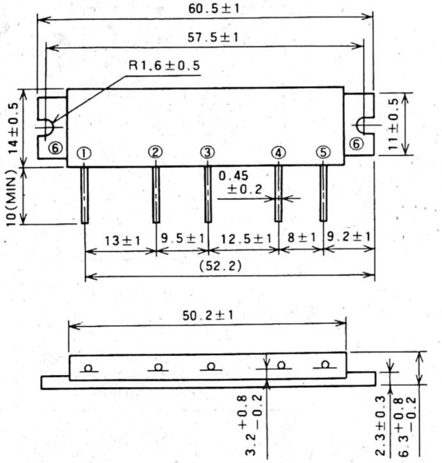


M67776H

896~941MHz, 7.2V, 5.0W, FM PORTABLE RADIO

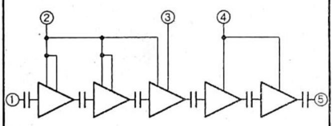
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1,2,3}$	Supply voltage		9.2	V
I_{CC}	Total current	$Z_G = Z_L = 50\ \Omega$	4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	4	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	8	W
$T_{C(OP)}$	Operation case temperature	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leqq 7.2V$	−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

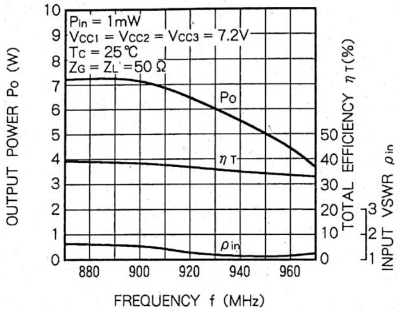
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 1mW$ $V_{CC1} = V_{CC2} = V_{CC3} = 7.2V$ $Z_G = Z_L = 50\ \Omega$	896	941	MHz
Po	Output power		5		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−30	dBc
3fo	3rd. harmonic			−30	dBc
ρ_{in}	Input VSWR			3.0	−
−	Load VSWR tolerance	$V_{CC2}=V_{CC3}=9.2V$, $P_O=5.0W$ (V_{CC1} controlled), Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation in output power		−

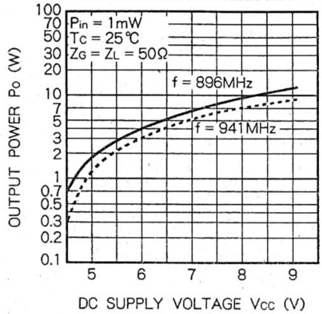
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

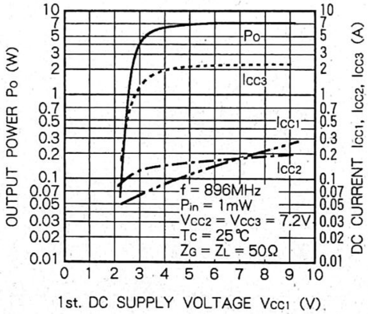
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



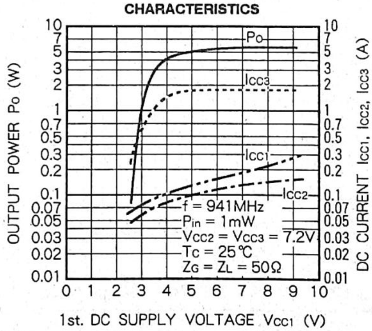
OUTPUT POWER VS. DC SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, DC CURRENT VS. 1st. DC SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, DC CURRENT VS. 1st. DC SUPPLY VOLTAGE CHARACTERISTICS

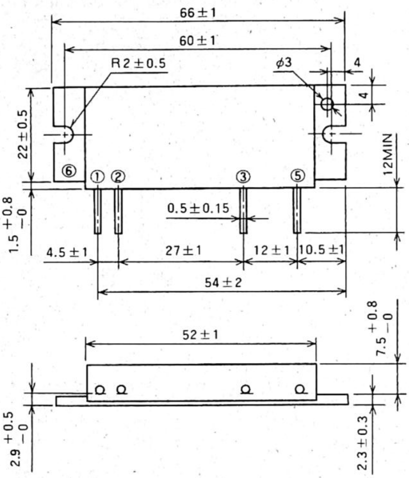


M67781L

135~160MHz, 12.5V, 40W, FM MOBILE RADIO

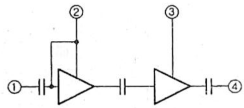
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		16	V
V_{CC2}			17	V
I_{CC}	Total current		12	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	50	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

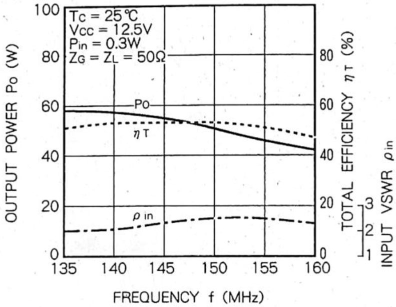
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 0.3W$ $V_{CC} = 12.5V$ $Z_G = Z_L = 50\ \Omega$	135	160	MHz
Po	Output power		40		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			3.0	−
−	Load VSWR tolerance	V_{CC}=15.2V, Po=40W(P_{in}:controlled) Load VSWR=8.8:1(All phase), 5sec. $Z_G = 50\ \Omega$	No degradation		−

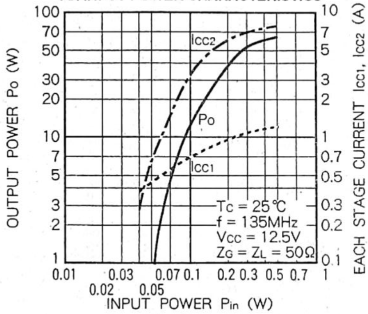
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

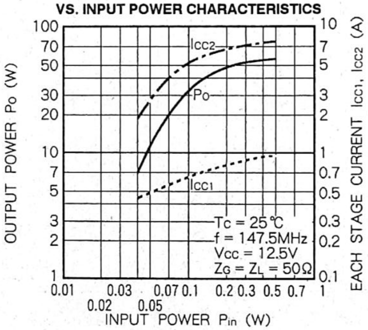
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



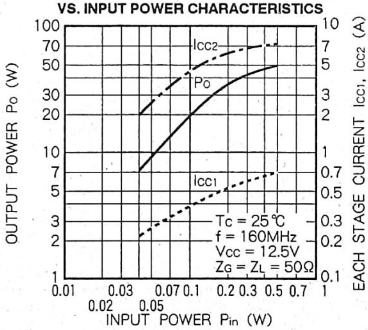
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



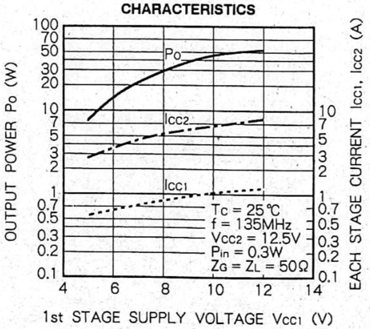
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



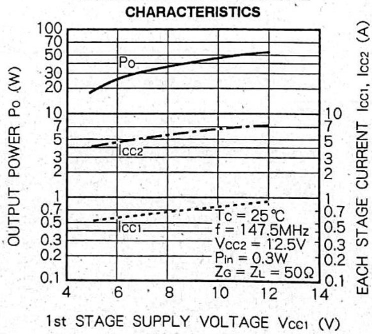
OUTPUT POWER, EACH STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



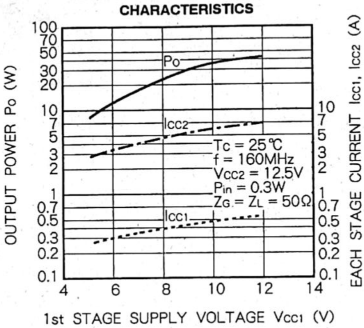
OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



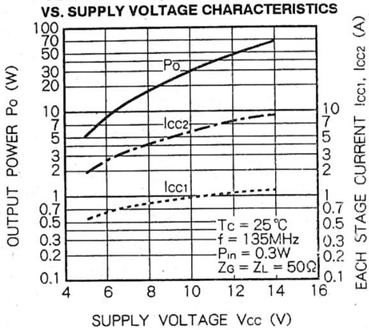
OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



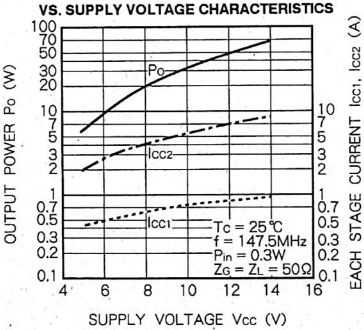
OUTPUT POWER, EACH STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



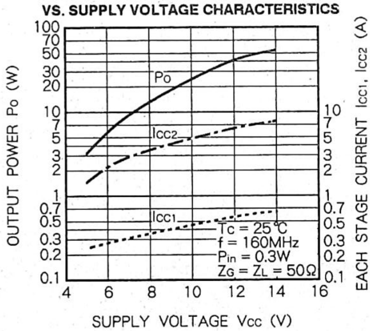
OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS

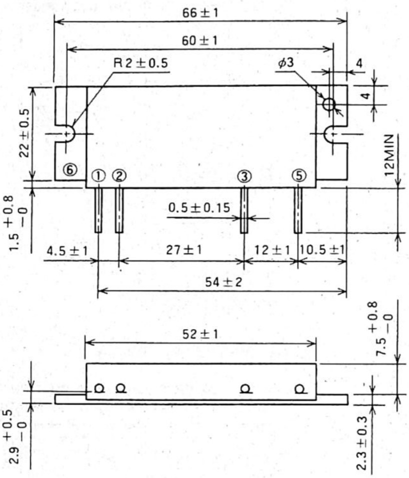


M67781H

150~175MHz, 12.5V, 40W, FM MOBILE RADIO

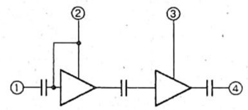
OUTLINE DRAWING

Dimensions in mm



H2

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④Po : RF OUTPUT
⑤GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		16	V
V_{CC2}			17	V
I_{CC}	Total current		12	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	0.6	W
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	50	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

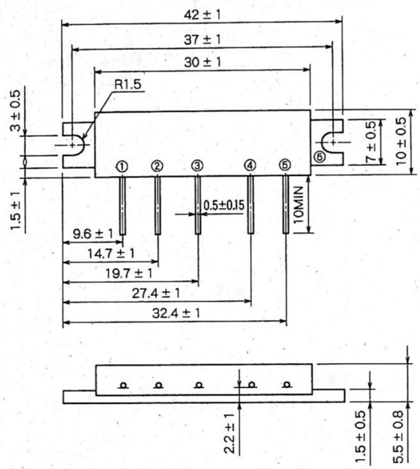
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	P_{in} = 0.3W V_{CC} = 12.5V $Z_G = Z_L = 50\ \Omega$	150	175	MHz
Po	Output power		40		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−30	dB
3fo	3rd. harmonic			−30	dB
ρ_{in}	Input VSWR			3.0	−
−	Load VSWR tolerance	V_{CC}=15.2V, Po=40W (P_{in} : controlled) Load VSWR=8.8:1(All phase), 5sec. Z_G = 50 Ω	No degradation		−

M67783

1240~1300MHz, 7.2V, 1.4W, FM PORTABLE RADIO

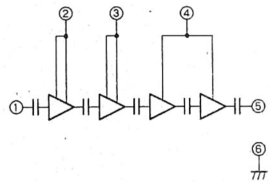
OUTLINE DRAWING

Dimensions in mm



H27

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1,2}$	Supply voltage		7.5	V
V_{CC3}		$V_{CC1,2} \leq 7.2V$	15	V
I_{CC}	Total current		2.5	A
$P_{in(max)}$	Input power	$V_{CC1,2} \leq 7.2V$, $Z_G = Z_L = 50\ \Omega$	10	mW
$P_{o(max)}$	Output power	$V_{CC1,2} \leq 7.2V$, $Z_G = Z_L = 50\ \Omega$	2.5	W
$T_{C(OP)}$	Operation case temperature		− 20~100	℃
T_{stg}	Storage temperature		− 40~110	℃

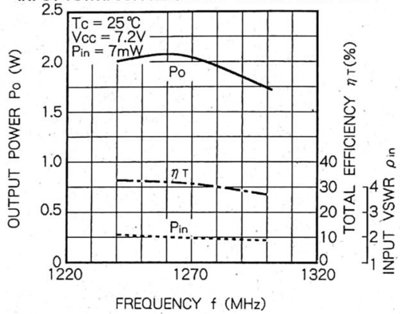
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$V_{CC1} = V_{CC2} = V_{CC3} = 7.2V$ $P_{in} = 7mW$ $Z_G = Z_L = 50\ \Omega$	1240	1300	MHz
Po	Output power		1.4		W
η_T	Total efficiency		20		%
2fo	2nd. harmonic			− 28	dB
ρ_{in}	Input VSWR			3.5	−
−	Load VSWR tolerance	$V_{CC1} = 7.2V$, $V_{CC3} = 15V$, $P_{in} = 7mW$ P_o=1.4W(V_{CC2}:controlled) Z_G=50Ω Load VSWR=10:1(All phase), 2sec.	No degradation		−

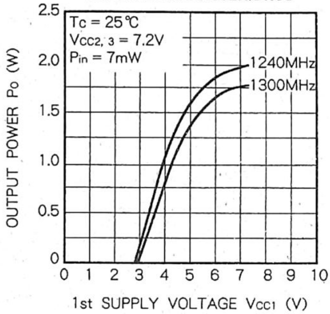
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

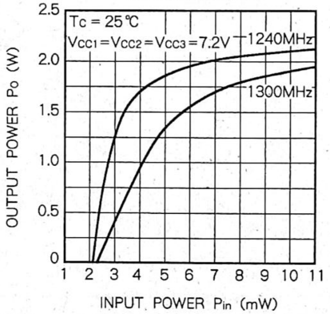
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR. VS. FREQUENCY CHARACTERISTICS



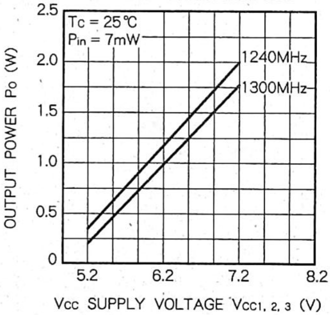
OUTPUT POWER VS. 1st SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER VS. Vcc SUPPLY VOLTAGE CHARACTERISTICS

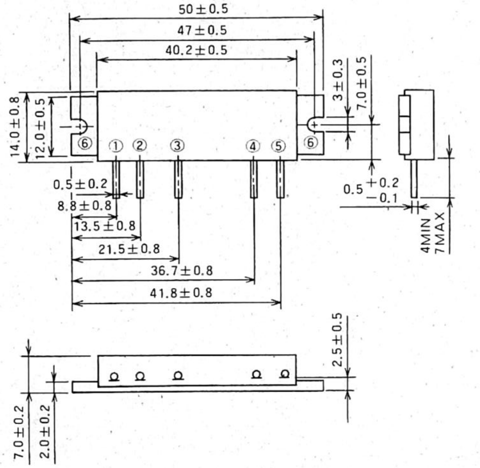


M67784

889~915MHz, 9.6V, 3.8W, FM PORTABLE RADIO

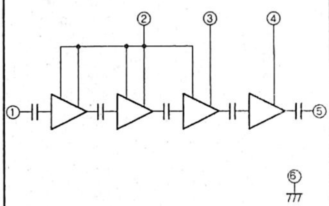
OUTLINE DRAWING

Dimensions in mm



H25

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②Vcc1 : 1st. DC SUPPLY
③Vcc2 : 2nd. DC SUPPLY
④Vcc3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

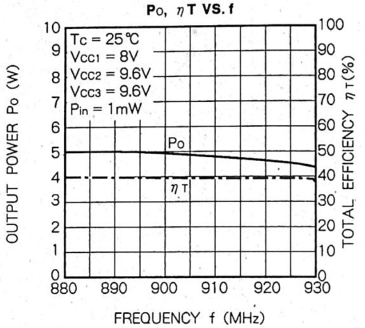
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		8.5	V
$V_{CC2,3}$			12	V
I_{CC}	Total current		3	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$, $V_{CC1} \leq 8V$	10	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	6	W
$T_{C(OP)}$	Operation case temperature		−30~90	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

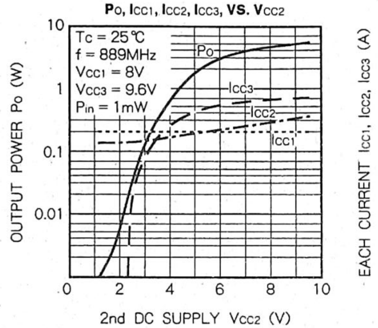
Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	$V_{CC1} = 8V$ $V_{CC2} = V_{CC3} = 9.6V$ $P_{in} = 1mW$ $Z_G = Z_L = 50\ \Omega$	889	915	MHz
Po	Output power		3.8		W
η_T	Total efficiency		35		%
2fo	2nd. harmonic			−30	dB
ρ_{in}	Input VSWR			2.8	−
−	Load VSWR tolerance	$V_{CC1} = 8V$ $P_O = 3.8W$ (V_{CC2} : controlled) $V_{CC3} = 12V$, $P_{in} = 1mW$ Load VSWR=20:1(All phase), 2sec.	No degradation		−

TYPICAL PERFORMANCE DATA

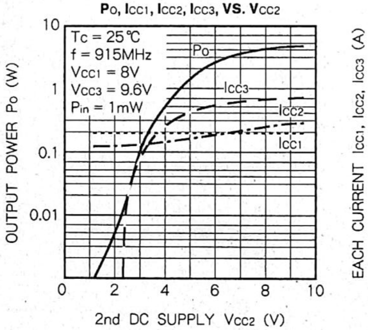
Po, ηT VS. f



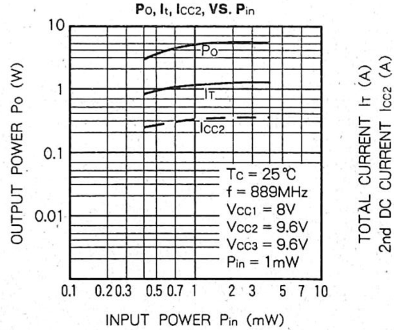
Po, Icc1, Icc2, Icc3, VS. Vcc2



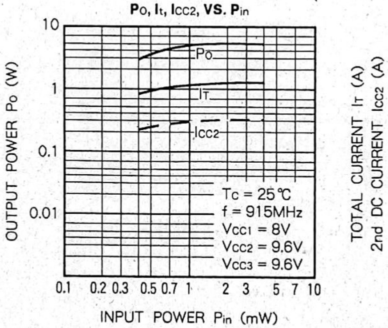
Po, Icc1, Icc2, Icc3, VS. Vcc2



Po, It, Icc2, VS. Pin



Po, It, Icc2, VS. Pin

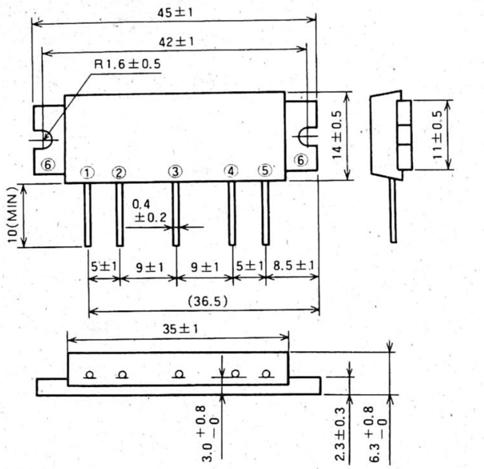


M67785

184~200MHz, 9.6V, 5W, FM PORTABLE RADIO

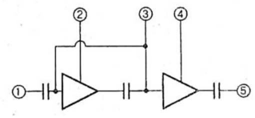
OUTLINE DRAWING

Dimensions in mm



H12

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		13	V
V_{BB}	Supply voltage		5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	30	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	7	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

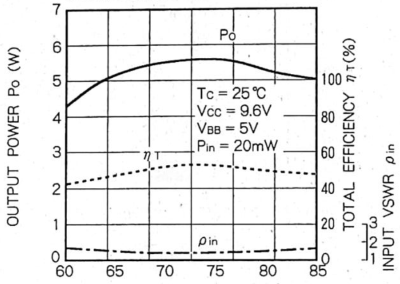
ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	P_{in} = 20mW, V_{BB} = 5V, V_{CC} = 9.6V, $Z_G = Z_L = 50\ \Omega$	184	200	MHz
Po	Output power		5		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−25	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{CC2} = 13V, V_{BB} = 5V, P_{in} = 20mW Po = 5W (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. Z_G = 50 Ω	No degradation		−

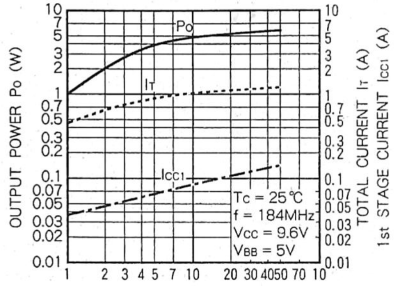
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

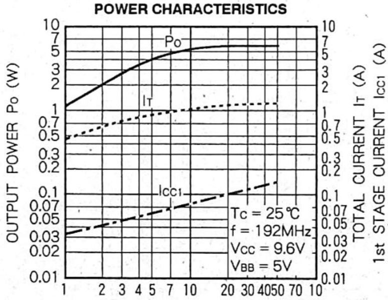
OUTPUT POWER, TOTAL EFFICIENCY, ρin VS. FREQUENCY CHARACTERISTICS



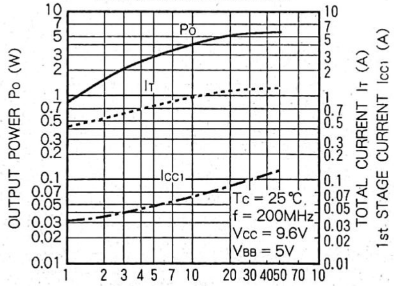
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



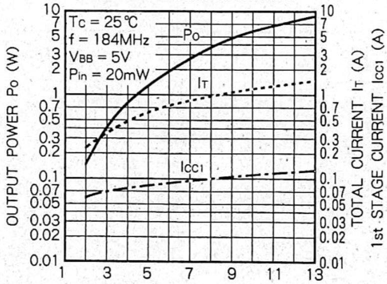
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



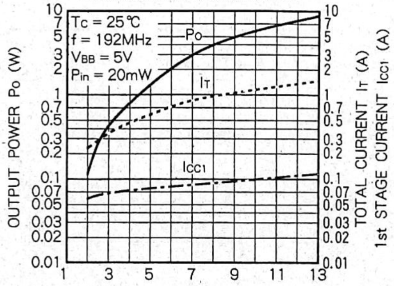
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. INPUT POWER CHARACTERISTICS



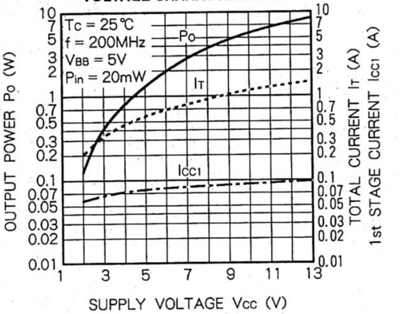
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



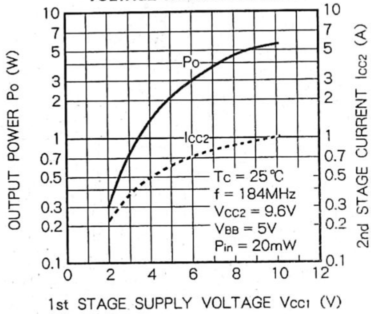
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



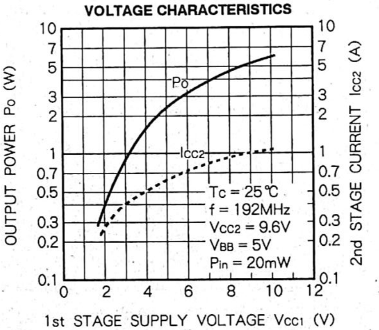
OUTPUT POWER, TOTAL CURRENT, 1st STAGE CURRENT VS. SUPPLY VOLTAGE CHARACTERISTICS



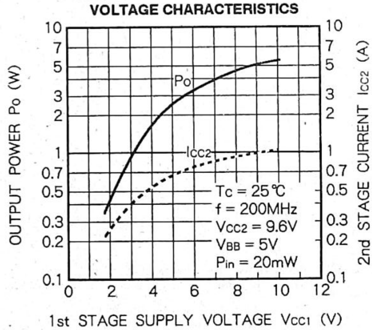
OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, 2nd STAGE CURRENT VS. 1st STAGE SUPPLY VOLTAGE CHARACTERISTICS

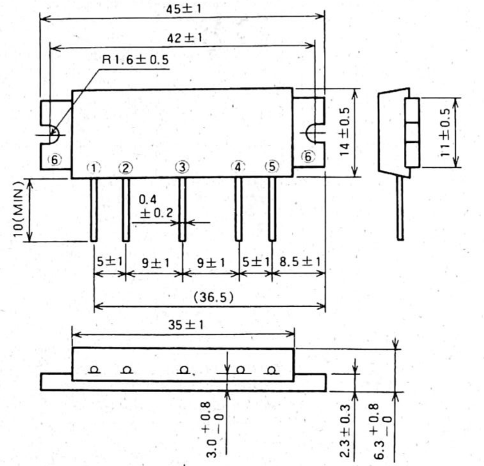


M67785H

220~240MHz, 9.6V, 5W, FM PORTABLE RADIO

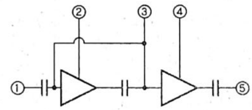
OUTLINE DRAWING

Dimensions in mm



H12

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VBB : BASE BIAS
④VCC2 : 2nd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		13	V
V_{BB}			5.5	V
I_{CC}	Total current		4	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\ \Omega$	30	mW
$P_{O(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	7	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 20mW$ $V_{BB} = 5V$ $V_{CC} = 9.6V$ $Z_G = Z_L = 50\ \Omega$	220	240	MHz
Po	Output power		5		W
η_T	Total efficiency		40		%
2fo	2nd. harmonic			−20	dB
3fo	3rd. harmonic			−25	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	$V_{CC2} = 13V$, $V_{BB} = 5V$, $P_{in} = 20mW$ Po = 5W (V_{CC1} : controlled) Load VSWR=20:1(All phase), 2sec. $Z_G = 50\ \Omega$	No degradation		−

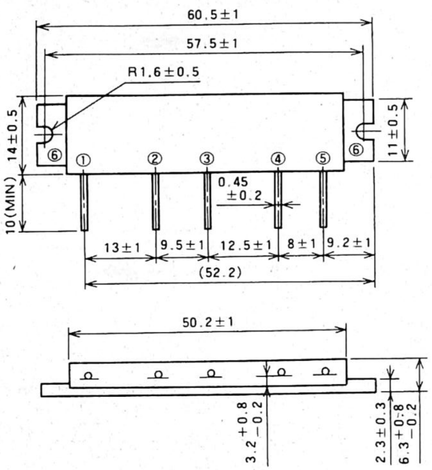
MITSUBISHI ELECTRIC

MITSUBISHI RF POWER MODULE

M67789

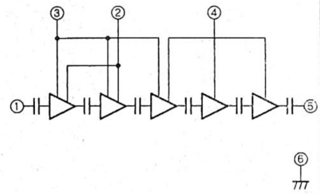
1465~1477MHz, 9.6V, 3W, FM PORTABLE RADIO

OUTLINE DRAWING Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
① Pin : RF INPUT
② VCC1 : 1st. DC SUPPLY
③ VBB : BASE BIAS
④ VCC2 : 2nd. DC SUPPLY
⑤ Po : RF OUTPUT
⑥ GND : FIN

ABSOLUTE MAXIMUM RATINGS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage	$V_{BB} \leq 5.5V$	12	V
V_{CC2}		$P_o \leq 5W$, $V_{BB} \leq 5.5V$, $Z_G' = Z_L = 50\Omega$	12	V
V_{BB}			5.5	V
I_{CC}	Total current		3	A
$P_{in(max)}$	Input power	$V_{CC1} \leq 9.6V$, V_{BB}=5V, Z_G=Z_L=50Ω	10	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\ \Omega$	5	W
$T_{C(OP)}$	Operation case temperature		−30~110	℃
T_{stg}	Storage temperature		−40~110	℃

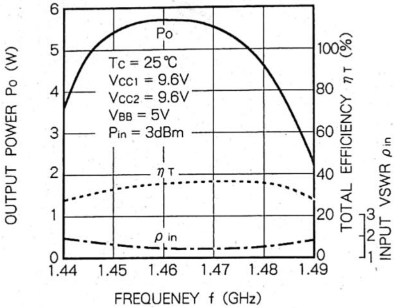
ELECTRICAL CHARACTERISTICS (T_c = 25℃ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits Min	Limits Max	Unit
f	Frequency range	V_{CC1} = 9.6V V_{BB} = 5V, V_{CC2} = 9.6V, P_{in} = 2mW $Z_G = Z_L$ = 50 Ω	1465	1477	MHz
Po	Output power		3		W
η_T	Total efficiency		30		%
2fo	2nd. harmonic			−25	dB
ρ_{in}	Input VSWR			2.5	−
−	Load VSWR tolerance	V_{BB} = 5V, V_{CC2} = 11V Po = 3W(V_{CC1}: controlled) P_{in} = 2mW, Z_G = 50Ω Load VSWR=10:1(All phase), 5sec.	No degradation		−

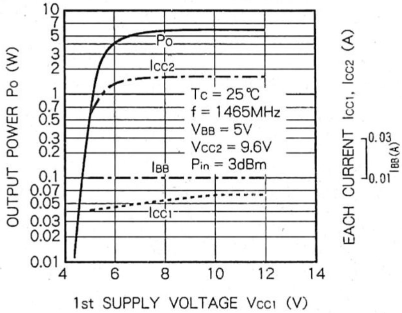
MITSUBISHI ELECTRIC

TYPICAL PERFORMANCE DATA

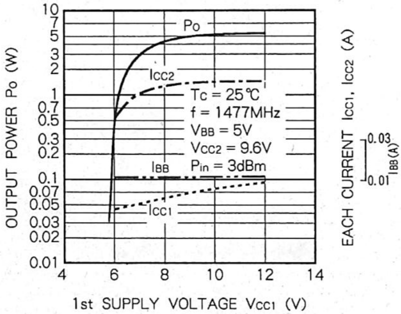
OUTPUT POWER, TOTAL EFFICIENCY INPUT VSWR VS. FREQUENCY CHARACTERISTICS



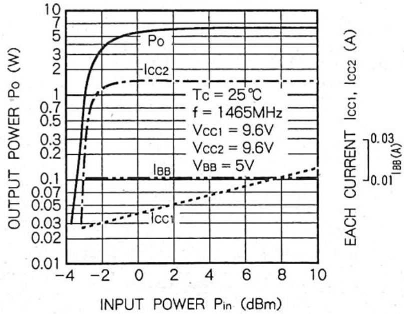
OUTPUT POWER, EACH CURRENET VS. 1st SUPPLY VOLTAGE CHARACTERISTICS



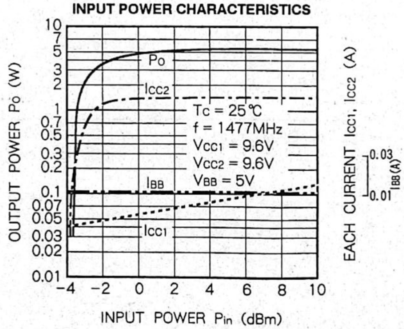
OUTPUT POWER, EACH CURRENET VS. 1st SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, EACH CURRENET VS. INPUT POWER CHARACTERISTICS



OUTPUT POWER, EACH CURRENET VS. INPUT POWER CHARACTERISTICS

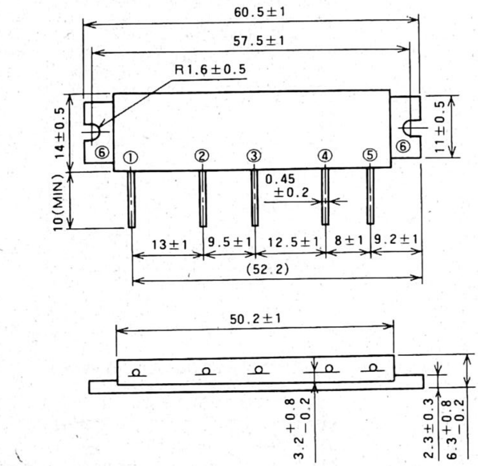


M67790

945~951MHz, 8.0V, 4.0W, FM PORTABLE RADIO

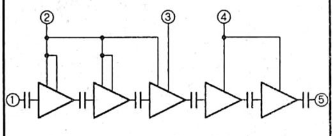
OUTLINE DRAWING

Dimensions in mm



H11

BLOCK DIAGRAM



PIN :
①Pin : RF INPUT
②VCC1 : 1st. DC SUPPLY
③VCC2 : 2nd. DC SUPPLY
④VCC3 : 3rd. DC SUPPLY
⑤Po : RF OUTPUT
⑥GND : FIN

ABSOLUTE MAXIMUM RATINGS (Tc = 25℃ unless otherwise noted)

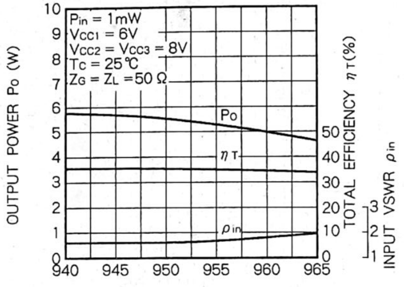
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC1}	Supply voltage		8	V
V_{CC23}			10	V
I_{CC}	Total current	$Z_G = Z_L = 50\Omega$	3	A
$P_{in(max)}$	Input power	$Z_G = Z_L = 50\Omega$, $V_{CC1} \leq 8.0V$	2	mW
$P_{o(max)}$	Output power	$Z_G = Z_L = 50\Omega$, $V_{CC1} \leq 8.0V$	6	W
$T_{C(OP)}$	Operation case temperature	$Z_G=Z_L=50\Omega$, $V_{CC1}\leq 8.0V$, $P_o \leq 6.0W$	−20~80	℃
T_{stg}	Storage temperature		−40~110	℃

ELECTRICAL CHARACTERISTICS (Tc = 25℃ unless otherwise noted)

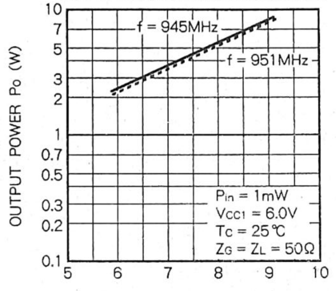
Symbol	Parameter	Test conditions	Limits		Unit
			Min	Max	
f	Frequency range	$P_{in} = 1mW$ $V_{CC1} = V_{CC2} = V_{CC3} = 8.0V$ $Z_G = Z_L = 50\Omega$	945	951	MHz
Po	Output power		4		W
η_T	Total efficiency		30		%
2fo, 3fo	2nd. & 3rd. harmonics			−30	dBc
ρ_{in}	Input VSWR			3.0	−
−	Load VSWR tolerance	$V_{CC2}=V_{CC3}=10.0V$, $P_o=5W$ (V_{CC1} controlled), Load VSWR=20:1 (All phase), 2sec. $Z_G = 50\Omega$	No degradation in output power		−

TYPICAL PERFORMANCE DATA

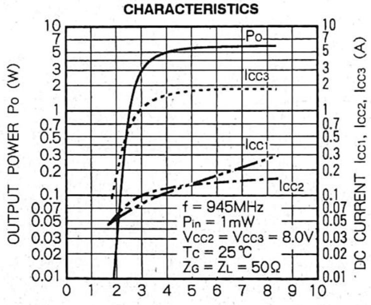
OUTPUT POWER, TOTAL EFFICIENCY, INPUT VSWR VS. FREQUENCY CHARACTERISTICS



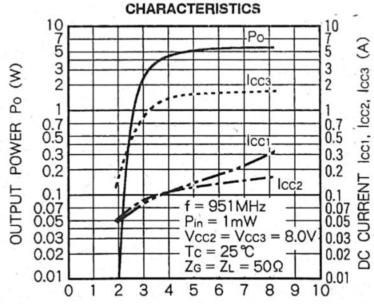
OUTPUT POWER VS. 2nd. & 3rd. DC SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, DC CURRENT VS. 1st. DC SUPPLY VOLTAGE CHARACTERISTICS



OUTPUT POWER, DC CURRENT VS. 1st. DC SUPPLY VOLTAGE CHARACTERISTICS



MITSUBISHI SEMICONDUCTORS
RF POWER SEMICONDUCTORS 1993

MITSUBISHI ELECTRIC CORPORATION

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